GAS JOURNAL

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METAMORPHOSIS

ANNOUNCEMENT of further appointments to the Area Gas Boards was made by the Minister of Fuel and Power in the House of Commons on Thursday last. All appointments prior to this have been published in our columns, and in our issue to-day we give the entire set-up of the Boards as now obtaining. The new appointments—made, it should be noted, before Jan. 31 of this year—serve to confirm our view, expressed when the first list of appointments was officially made public in November of last year, that the sense of balance shown was encouraging. It will be seen from the list we give on a later page that the balance of which we then spoke has been maintained. It is undoubtedly a heartening sign. We discern in those few instances where men of proved worth within the gas industry have accepted appointment to Boards covering areas other than those in which their major experience has been gained, strength and broad vision towards the aim of a unified industry working on a national basis. The industry is undergoing metamorphosis, which is variously defined as a change of form either by magic or by natural development. We think that natural development is the definition which here applies.

For some time we have known the constitution of the Gas Council; we now have the constitution of the Area Gas Boards. The next step—and an all-important one—is the appointment of staff at local as distinct from national level, and it is laid upon each Area Board to make its own decisions in this regard. It does not follow—and, we are assured, it will not follow—that there should be rigidity in form as between the staff establishment of the Areas. The Areas differ climatically, industrially, and in many other ways. Each area will have its special problems which will need individual treatment in the light of these special problems and particular circumstances. Over-riding is the fact that the Area Boards have their autonomy, and we believe that when the gas industry passes to the State on May 1 next the change will be characterized not by any upheaval but by a smoothness and confidence which will be the direct result of planning within the industry by those who understand intimately the needs of an industry faced with the task—a task in common throughout the Areas—of endeavouring to lessen the gap between the demand for gas and the possibilities of supply, always with the interests of the country and the community as the prime factor.

The Gas Council is actively pursuing this aim, formulating its plans, offering its guidance, within the framework of the Gas Act of 1948; and we may say that the Council takes us into its confidence in regard to its work. For some time we have known of the consideration being given to the necessary absorption within a nationalized gas industry of those specialized organizations, with all their wealth of experience and applied technique, which have been built up on a national basis in an industry under private and municipal ownership, and whose continued work must be assured. Change and modification are inevitable, but the need for their functional work remains and to our mind is greater to-day than ever. A secretariat will have to be established at Gas Industry House to deal with the activities of the Council and provide a working channel between the Council and the Area Boards. There will be other changes; we think that in the event many of these changes will be in form rather than in substance, and we hold the view that many opportunities enhanced in status and scope lie ahead for the gas industry's personnel.

That, it seems to us, is the broad picture. The change is in being, seemingly without undue commotion. There are some affected by the change who hold the view firmly that powerful incentive to individual effort will be lacking in the organization of the nationalized gas industry—that the datum line of worth as measured by remuneration for services rendered is set too low and that there is little premium for enterprize. Yet we would emphasize again that the industry is on the verge of very great development, and it does not follow that future prizes will not be worth working for and having. It is certain that on May 1 problems facing the industry will not be swept away by any magic wand. Their solution awaits a determined evolutionary drive, and it is to be hoped that under nationalization a greater measure of unity of action will be achieved. As hitherto, success will not be achieved unless the man on the spot is left free to exercise his responsibility with as few trammels as possible.

OXIDE PURIFICATION AT LIVERPOOL

THE study by Mr. L. G. Townsend of oxide purification practice at Liverpool during the last few years runs to something like 30,000 words. A large number of these words will be published in "GAS." Presented to the Manchester Junior Association of Gas Engineers, its digestion must have been a formidable task to members who wished to make intelligent criticism. It appears to be one more to add to the 14 cases covered by the Interim Report on the Hardening of Oxide in Purifiers presented at the autumn meeting of the Institution of Gas Engineers. It makes a very valuable contribution to the controversy.

The first question one is tempted to ask is, to what extent does this experience confirm the tentative explanations and recommendations put forward in the interim report? It appears to confirm that caking is minimized by obtaining a uniform charge of low density and by care in charging. On the other hand, "the one case where a hard cake was obtained was where part spent oxide was blended with new." The "present tendency" to deeper oxide beds is deprecated. Not very much is said about the efficiency of complete detarring, but it is agreed, from the point of view of the ill effects of condensation from the gas, that the lowest temperature in the gas stream should occur at inlet purifiers. Doubt is thrown upon the use of the electrostatic detarrer

before the purifiers. It did not appear to effect an appreciable reduction in the tar content of spent oxide. But "the nature of the material which is expressed as tar is something of a mystery and could well stand further investigation." The effects of preheating and saturation of the gas and the use of lagging are fully discussed. While lagging is useful for temperature control, particularly in the winter, it is pointed out, in agreement with Avery, that reactions within the boxes, in general, generate sufficient heat to maintain a good working temperature. The discussion of operation with varying space velocity (R ratio) is interesting. The conclusion seems to be that, with low values of R, sulphur tends to be formed quickly in the top layer necessitating early forking to reduce the effects of caking. Extremely hard cake was found in boxes where R is low and the box life extended. Comparatively soft cakes were obtained in one works where R was higher. The importance of the caking problem is underlined in the fact that in one instance the cost of purification attributable to dealing with caking amounted to 30% of the total purification labour charges. Nothing much is said about manipulation of the direction of gas flow.

We gathered from Mr. Bell's presentation of his paper on Gas Distribution to the North Western Section of the Institue of Fuel at Manchester on Jan. 12 that the four works of the Liverpool undertaking are interconnected, and that three of them are maintained under constant load, variation in demand being taken up in the fourth. This system may become widely adopted as integration proceeds under the new régimé, and it may be that purifiers operated under constant R ratio may lend themselves to regulation in such a manner as to reduce caking and back-pressure troubles.

Mr. Townsend's paper is a very fine piece of work; of that we have no doubt. There is much in it besides caking and back-pressure. There is, in particular, one observation which will win the assent of most of the workers in this field. There are several undertakings which encounter little trouble in the operation of their oxide purifiers. They may be tempted to assume that if their methods were followed by others they would meet with the same success. But this is only true to a very limited extent, and it is suggested that principles should be laid down and recommendations offered always "with a spice of humility."

MIDLAND HISTORY

THE expression "historic occasion" has been overworked to such a degree that there is now a natural and proper hesitation before its use is condoned. It is unlikely, however, that critics of unwelcome banality will protest at its application to the visit to Redditch on Feb. 3 of the Midland Junior Gas Association. Not only was the occasion historic in the sense that it was the Association's last visit and the Company's last opportunity to extend its hospitality before nationalization; it also roused some historical memories. A quarter of a century had elapsed since the Association's first visit to Redditch when Mr. W. J. Pickering took a group photograph at the works. History repeated itself this month when Mr. Pickering took a similar shot, and we hope that one day he will do a hat trick! Mention must also be made of Mr. L. E. Clift, Chairman and Managing Director of the Redditch Gas Company, who in March will have been a Director of the Company for no less than 59 years and its Chairman for 51. In view of this fine record, it is not surprising to learn that there have been only four chairmen of the Company since it was established in 1873. Mr. Clift has seen the total annual make of the works rise from 33 mill. cu. ft. to nearly 900 mill cu. ft., due to the rapid growth of industry in and around the town. This has been so great that almost 80% of the gas manufactured at the Redditch Works goes to industry. Much of the credit for this expansion is due to the efforts of Mr. C. F. W. Rendle, Engineer and Works Manager, who must, we feel, have derived much pleasure from this visit, for he was himself President of the Midland Juniors during the 1922/23 session.

SALESMEN'S DAY

The prospect of the changes which may occur after vesting date has engendered speculation among associations and similar organizations within the industry. A sense of uneasiness is prevalent among the members of Salesmen's Circles, and the reason is not hard to find. Unlike most associations which achieve individuality and financial independence, the Circles are indebted to the British Gas Council for their existence. Let it not be thought, however, that they act in any way as a mere ventriloquist's dummy; on the contrary, the Circles are vigorous, progressive, and eager to increase their scope and effectiveness. At present they are troubled on two scores: Will Circles in future conform to the geographical boundaries of the Area Boards, and in what way will they be financed, controlled, and assisted in their work? We do not know the answer to these questions. But there is one way in which the Circles can to an extent be reassured—by the revival of Gas Salesmen's Days, which was a popular annual function of pre-war days. With attendances frequently over the 500 mark, Circle members from all parts of the British Isles used to assemble in the Caxton Hall to hear reports from each region and an address from a guest speaker. The desirability for reviving this function received editorial comment in "GAS SERVICE" some months ago and formed the subject of many letters received at this office. It is clear that such a function, providing as it would an opportunity for an authoritative statement on the Gas Council's attitude towards the Circles, exercises a considerable appeal. The British Gas Council is well aware of this desire and has no doubt been considering a gathering of this nature for some time. We hope and believe it will take place shortly. The fear that the Circles will not receive the recognition which is their due has prompted a number of suggestions from both individuals and the Circles as such. One of these concerns the formation of an Association of Gas Salesmen, eligible only to senior salesmen of defined status and with certain qualifications. The functions of such a body would include the furtherance of enlightened salesmanship (linked no doubt with the Institution Course), and the formulation of Circle policy, establishing a closer contact between the different groups. This last point is, in our view, essential if a higher standard is to be achieved. The machinery to bring this about could be quite modest, only entailing regular discussions between Circle officers on matters concerning the planning and administration of their groups. It would appear, however, that some advocates of such an association envisage it as a means to keep the Circles' well-being secure in the face of possible neglect on the part of the industry's planners. This we consider to be an unnecessary duty.

The solution to this and to many kindred anxieties would lie in a Salesmen's Day, and we hope those about to take over the helm of the gas industry will recognize these problems and take steps to reassure and advise those concerned. A comparatively simple guarantee of this nature would have a far-reaching and beneficial effect on the Salesmen's Circles and enable them to continue the work which for over a quarter of a century has made the combination of salesmanship and service a dominant and healthy gas industry.

B. H. D. ENGINEERS LTD.

The British Shareholders Trust, Ltd., has made application to the Council of the Stock Exchange, London, through its brokers, Messrs. Linton Clarke & Co., for permission to deal and for a quotation for the whole of the issued Preference and Ordinary shares in the capital of B.H.D. Engineers, Ltd., consisting of 600,000 5% Redeemable Cumulative Preference shares of 10s. each and 700,000 Ordinary shares of 10s. each. The Company's business is that of a holding company and was formed to acquire the entire issued capital of the Bryan Donkin Company, Ltd. (originally founded 1803), and of W. C. Holmes & Company, Ltd. (originally founded 1850). Both these companies carry on business as mechanical, chemical, and gas-works plant engineers and ironfounders. Included in the group are also the following partly owned sub-subsidiary companies: George Waller & Son, Ltd. (incorporated 1917), British Furnaces, Ltd. (incorporated 1921), B. Thornton & Sons, Ltd. (incorporated 1939), and Schofield & Taylor, Ltd. (incorporated 1911). A greatly increased amount of work on hand of all the companies in the group has made it imperative that both extension to plant and buildings, involving

considerable capital expenditure, and also expansion in technical and commercial personnel, should be provided for. The identity and management of the individual Companies remain as before.

INDUSTRIAL DISPUTES

Statistics published this month in the *Ministry of Labour Gazette* confirm the sense of increasing stability in industrial relations which was felt throughout last year. The number of working days lost, according to the *Gazette*, were 1,944,000, compared with 2,433,000 for 1947, of which a national strike in the vehicle building industry accounted for 450,000. There were 1,758 stoppages of work, of which about 1,115 were in the mining industry, but the number of miners involved was only 186,000 and the number of working days lost only 464,000 as compared with 307,900 and 912,000 respectively for 1947. Altogether 423,000 workers were involved in stoppages, which represent about 2% of the total population in civil employment, and the time lost averaged about five working days per man. In the same period, the index of wage rates, taking June, 1947, as 100, rose from 103 in December, 1947, to 105 in March and to 107 by the end of the year. This increase of 4% compares with 5% for 1947 and 8% for 1946. In all, about 7¾ mill. workers received a net increase of £1,900,000 a week. 2,800,000 more workers received increases than in 1947, but the weekly increase of wage rates was only £160,000 more. These increases were offset by a parallel increase in the index of retail prices, which was slightly more than the increase in the index of wage rates.

Personal

Presentation to Mr. G. le B. Diamond

Fifty-six engineers, managers, and secretaries of gas undertakings in Kent, Surrey, and Sussex, attended a luncheon party at Bearsted, near Maidstone, on Feb. 9, arranged as a result of a spontaneous movement throughout the area to express appreciation to Mr. G. le B. Diamond, Director, Engineer, and General Manager. Rochester, Chatham, and Gillingham Gas Company, of his services as Regional Controller of the Ministry of Fuel and Power, and in many other capacities, and to wish him success in his new appointment. There were 71 subscribers to the presentation.

The arrangements were in the hands of an Organizing Committee consisting of Messrs. R. H. Ruthven (Chairman), R. Prince, J. H. Hornby, J. D. C. Woodall, W. A. Barnett, and J. W. Townsend (Secretary).

The Chair was taken by Mr. Ruthven, Engineer and Manager of the Ramsgate Gas Department, who recalled some of the occasions on which he had met Mr. Diamond in earlier years, his appointment to Folkestone, and later to Rochester. His first public appointment was as Regional Gas Engineering Adviser, which entailed a great amount of work. This was so successfully undertaken that he was finally appointed Regional Controller, Ministry of Fuel and Power. He had now been appointed Chairman of the West Midlands Gas Board, and they congratulated him most heartily on the appointment. He was sure to be a success for he had the capacity for friendship and the power of making everyone happy, and this made for close co-operation. They were there to-day to express their friendship and this was the theme which he would like to stress. He hoped that Mr. Diamond might be spared for many years to be the success they all knew he would be, but they were extremely sorry that he had to be removed from the Area.

Mr. J. W. Townsend, Engineer and General Manager, Tunbridge Wells Gas Company, added congratulations and read letters of good wishes from Messrs. J. R. W. Alexander, H. A. Probin, R. H. Sandford Smith, H. R. Hazeldine, F. Dawson, A. J. Stickels, and W. H. Emery.

Mr. Diamond, in replying, said he was proud to feel that he had won from them such confidence that it had brought about that large gathering of friends from all parts of the Region. He could assure them that he had found his work in the Region intensely interesting. Those in the gas industry owed an immense debt of gratitude to the Ministry of Fuel and Power, especially to the Gas Division for the wonderful job of work they had done over a number of years with a very small staff, few of whom had been in the gas industry before they joined the Ministry. He had spent a happy time in the South Eastern Region, and it was with regret that he was leaving it.

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Mr. HUGO FALK, Chairman and Managing Director of Falk, Stadelmann & Co., Ltd., left England on Feb. 3 to visit the company's three South African branches in Johannesburg, Cape Town, and Durban.

Mr. W. S. GOOCH, Staff Controller of the Gas Light and Coke Company, has been appointed Controller of Services. Mr. R. N. BRUCE has been appointed Staff Controller and will continue to hold the responsibilities that he has exercised as Controller of Industrial Relations. These changes are consequent on the appointment, already announced, of Mr. R. S. Johnson as Deputy Chairman of the South Eastern Gas Board.

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Mr. S. E. D. WILSON, Deputy Chairman of the Northern Divisional Coal Board, will retire shortly. When he accepted the position in June, 1946, he made it clear that he did so in order to help facilitate the transition from private enterprise to nationalization. Accordingly, Mr. Wilson expressed a desire to retire in May last, but agreed to stay on for a time longer and continue his help in the development of the divisional organization. He now wishes to be free to retire as soon as a successor can be appointed and become familiar with the duties.

Obituary

The death occurred suddenly on Feb. 4 of Mr. JAMES R. THOMSON, of James R. Thomson & Co., Ltd., gas and electrical equipment suppliers, Glasgow.

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By the death of Mr. H. T. WING, Cambridge has lost a notable figure in the municipal and commercial life of the town. Mr. Wing, who died on Jan. 28, had been a Councillor since 1918, was made an Alderman in 1933, becoming Mayor in 1935. In 1931 he joined the Board of the Cambridge University and Town Gas Light Company, and was a Vice-President of the Company's Recreation Club. Other activities included the Chairmanship of the Conservators of the Cam, the Vice-Chairmanship of the Cambridge Permanent Building Society, and a Governorship of the Perse School for Girls.

Diary

Feb. 17.—**Building Industries Luncheon Club:** Chairman: Mr. G. R. Jackson (Crane, Ltd.). Speaker: Prof. Sir Alfred Egerton, F.R.S., M.A., F.I.C., F.Inst.Physics, B.Sc., M.I.Chem.E. "The Heat Load." Hungarian Restaurant, 12.30 p.m.

Feb. 19.—**Yorkshire Junior Gas Association:** "The Manufacture of Sulphuric Acid in relation to the Disposal of Spent Oxide," B. Thorpe, M.Inst.Gas E., M.Inst.F., Engineer-in-Charge, Grimesthorpe Works, Sheffield and District Gas Company.

Feb. 21.—**London and Counties Coke Association:** Finance Committee, 11 a.m., Executive Committee 11.30 a.m., Central Committee 1.30 p.m., Gas Industry House.

Feb. 22.—**Wales and Monmouthshire Junior Gas Association:** Visit to New Works, Pontypool.

Feb. 22.—**Midland Junior Gas Association:** Students' meeting. Visit to Coventry Gas Department.

Feb. 22.—**Southern Association of Gas Engineers and Managers (Eastern District):** "The Evolution of the Gas Showroom," F. A. Cheeseman, Sales Manager, Wandsworth and District Gas Company. Gas Industry House, 2.30 p.m.

Feb. 23.—**Industrial Gas Development Committee:** Meeting. Gas Industry House, 9.30 a.m.

Feb. 23.—**London and Southern Junior Gas Association:** Visit to the Chiswick Works of the London Transport Executive.

Feb. 23.—**Western Junior Gas Association:** Visit to the Van Heusen Works, Taunton. "Works Planning." F. S. Hickin (Taunton).

Feb. 24.—**Scottish Junior Gas Association (Western District):** Visit to G. and J. Weir, Ltd., Cathcart.

Feb. 24.—**Institution of Chemical Engineers** (Joint Meeting with Low Temperature Group of the Physical Society): "Materials of Construction for Use at Low Temperatures," E. W. Colbeck. Geological Society, Burlington House, Piccadilly, W.1. 5.30 p.m.

Mar. 1.—**Wales and Monmouthshire Junior Gas Association:** Visit to Colliery, No. 5 Area, N.C.B., Rhymney Valley.

Mar. 3.—**Midland Junior Gas Association:** Evening visit to the works of Brotherton & Co., Ltd., Birmingham.

Mar. 4.—**Scottish Junior Gas Association:** Joint Meeting of Eastern and Western Districts in Glasgow. Address by F. M. Birks (Junior Vice-President, Institution of Gas Engineers).

Mar. 9.—**B.G.C. Domestic Development Committee,** Gas Industry House, 2.30 p.m.

News in Brief

Houghton-le-Spring District Gas Company's annual dinner was held in Sunderland on Jan. 29. Mr. George W. Martin, M.Inst.Gas E., Engineer and Manager, presided.

Billingham-on-Tees Urban Council has been informed by Stockton-on-Tees Gas Department that a new 12 in. gas main had been laid and a new gasholder was due to be started this year at the Haverton Hill area. This would ensure an adequate gas supply for the area.

The Thirteenth Annual Party of Messrs. Yeomans & Partners, Ltd., was held at the New Town Hall, Hammersmith, on Jan. 18, and some 600 friends and guests of the Company, including a number of representatives of gas undertakings, had a very enjoyable evening. Awards for examples of the best craftsmanship were made to several of the company's foremen, chargehands, craftsmen and apprentices. Cabaret and dancing continued until midnight.

Three Very Successful Meetings of the Airdrie Branch of the Women's Gas Council have been held recently, comprising a cookery demonstration on "Christmas Fare," by Miss Aitken, of the British Gas Council, a talk illustrated with film strips on "Eating Wisely," by Miss Warnock, of the Ministry of Food, and a demonstration on "Home Dyeing and Ironing," by Miss Eagles, of the Rinso Wash-Testing Laboratories. The Branch now has a membership of 70.

Lincoln Gas Committee received a report from Mr. George Wright, Engineer and Manager, that the coal position had deteriorated slightly due to falling off in deliveries and an increased gas consumption. Stock was equivalent to about two weeks' supply. On Jan. 3 there was a record output of 6,213,000 cu.ft. of gas from the gas-works. Compared with the corresponding period of last year, there was an increase in output during the nine months ended December of 38 mill. cu.ft.

The Cambridge Trades Fair, the first of its kind, was held in the local Corn Exchange, from Jan. 17 to Jan. 21. It is hoped it will become an annual event. The fair was visited by many thousands of visitors. The Cambridge University and Town Gas Light Company's stand showed appliances for house warming, cooking, laundering, water heating and refrigeration. A local furnishing concern exhibited a model gas kitchen where the Gas Company's Home Service Advisers gave daily cookery demonstrations.

Mr. Hugh Gaitskell, Minister of Fuel and Power, is to open on Mar. 4 the first of four new carbonizing plants which are part of the Rochdale Gas Department's scheme of reconstruction involving a total expenditure of well over £1,250,000. Other prominent figures in the gas industry are expected to be present and the ceremony will be followed by a civic luncheon. At the same time the 105th anniversary of the municipal ownership of the 125-year-old undertaking will be celebrated. The war prevented the centenary's celebration in 1944.

The Council of Industrial Design, which is responsible for the selection of all contemporary manufactured articles to be shown in the main exhibition of the Festival of Britain, 1951, and the provincial exhibitions and festivals, announces that it has opened a "1951 Stock List." This is a photographic card index of all manufactured products of such a standard of excellence as could qualify them for display in 1951, or at least for submission to a panel of selectors. To ensure a wide representation of all branches of industry and the maximum number of firms in each branch, the Council of Industrial Design invites immediately and urgently all manufacturers to send to the Chief Industrial Officer of the Council photographs, catalogues, leaflets or samples illustrating those items which they consider to be their best work, bearing in mind that best selling lines are not always those which a firm considers its best designs.

In Recommendations on a dispute between the Alliance and Dublin Consumers' Gas Company and the Workers' Union of Ireland, the Eire Labour Court states that the union claimed that the existing differential of 3s. 1d. a week paid to workers in the cooker assembly shop over the rate paid to labourers should be increased by 3s. to 6s. 1d. The Court was not satisfied that the claim was substantiated and could not recommend that any general increase should be granted. The Court understood that agreement had been reached to increase the present differential to 10s. in the case of workers engaged in the assembly of the more difficult apparatus and the workers possessed of a special degree of skill. The Court was not in a position to make any recommendation as to the actual workers who should benefit by this increase, and suggested that it should be the subject of direct negotiations. The Court recommended that the differential of 5s. paid in excess of the general rate to the assistant cooker-tester should be increased to 8s. The claim for an increase of 14s. 9d. for meter-testers, bringing their wages to £6 17s. 9d., is not justified, and no recommendation can be made.

Mr. W. J. Mason, Engineer and Manager of St. Ives (Hunts) Gas Company, has notified Huntingdon and District Trades' Council, following complaints of the poor gas supply, that new plant is now being built at the gas-works and should be in operation by the autumn.

Newcastle-on-Tyne and Gateshead Gas Company has placed a contract with Gas Chambers and Coke Ovens, Ltd., Westminster, London, S.W.1, for the installation of two intermittent vertical chamber carbonizing plants each of 4 mill. cu.ft. per day capacity at the Howdon-on-Tyne Works, Wallsend.

At a Meeting of the Gas Light and Coke Company's stockholders, at Gas Industry House, on Jan. 28, Sir Harold Howitt, G.B.E., D.S.O., M.C., F.C.A., a partner in the firm of Peat, Marwick, Mitchell & Co., Chartered Accountants, was elected the Stockholders' Representative for the Company.

The British Industries Fair Catalogue for the use of trade buyers throughout the world has now been completed. More than 10,000 have been distributed and the catalogue contains some 2,000 pages and is well indexed. No copies will be available for issue in the United Kingdom until the final edition is on sale at the Fair buildings.

Nuneaton Borough Council decided on Feb. 9 to support an application by Messrs. William White (Smallware), Ltd., to the Ministry of Fuel and Power for a reduction in the gas charges at Nuneaton. It was agreed that the question of a general reduction in gas charges for domestic consumers should be left for consideration by the new Area Board.

Hamilton Town Council is to make strong representations to the Regional Gas Officer of Scotland for a better service than that which is at present provided by the Uddingston Gas-works. Lanarkshire County Council are engaged in a scheme of major development to meet the many new industrial developments in the area and this is regarded as a factor in the situation.

Forty-five Years' Service by Mr. F. H. Tomlinson to Nottingham Gas Department came to an end last week when, to mark his retirement from the Assistant Managership of the showroom in Parliament Street, colleagues presented him with a clock. Mr. Tomlinson began work with the Department in 1903 on the meter and stove fixing staff and in 1925 went as clerk to the head office. The presentation was made by Mr. R. M. Wilkinson, Engineer and Manager.

The Central Office of Information are staging an exhibition on Mar. 21 for six weeks entitled, "On Our Way." It will explain Britain's economic position before and after the war, now and in 1952—at the end of Marshall Aid. Cartoon displays will cover the majority of labour, mechanization, reduction of cost, and productivity problems, and there will be dioramas on the essential need for increased production of coal, iron and steel, ships, vehicles and rolling stock, textiles, chemicals and agriculture.

The Trade Statistics for Dec., 1948, issued by the Department of Industry and Commerce in Eire, show imports of 15,513 tons of gas coal, valued at £68,796, as against 5,271 tons, valued at £13,131 in December, 1947. This brings the total of these imports for 1948 to 291,026 tons, valued at £1,292,756, compared with 108,060 tons, valued at £391,976, in 1947. In 1948, Eire imported 19,697 cwt. of gas heaters, cookers, and parts, valued at £197,618, as against 10,416 cwt., valued at £107,043, in 1947.

The Ideal Home Exhibition at Olympia will be held this year from Mar. 1 to Mar. 26. Houses built for sale by private builders will be on display for the first time in 10 years. The builders will give estimates and undertake to build houses of the four types shown for buyers who are able to obtain building licences from their local authorities. Other features of the Exhibition will be the dress design section, in which fashions for forthcoming British films will be displayed, the flower gardens, and demonstration of the latest labour-saving devices.

A Proposal of the Stourbridge Gas Committee that the gas undertaking should contribute £100 towards the cost of a new headquarters for the Institution of Gas Engineers met with some opposition when it came before the Council. Councillor R. G. Osborne, J.P., moved the rejection of the recommendation on the grounds that, although the amount involved was trivial, as a matter of principle, the ratepayers' money should not be spent in this way. Mr. S. J. D. Williams, Engineer and Manager, explained the purpose of the scheme. He said that the Institution was responsible for the education, training, and examination of all gas engineers, and added that until now the Institution had had to hold its meetings and conduct its affairs in hired premises. Most municipal gas undertakings, he said, were subscribing a sum equivalent to 2s. 6d. per mill. cu.ft. of gas sold per year, and Stourbridge's contribution would be on this basis. Councillor Osborne's proposition was defeated and the Committee's recommendation approved.

AREA GAS BOARD APPOINTMENTS

IN reply to a question put by Colonel R. S. Clarke (East Grinstead) the Minister of Fuel and Power informed the House of Commons on Feb. 10 that all the Area Gas Boards were duly constituted by Jan. 31 in that they consisted on that date of a Chairman and not less than three other members. He subsequently circulated in the Official Report a complete list of the membership to date, with the date of appointment in each case.

In order to present an overall picture of the industry as now constituted we give below the list circulated by the Minister (including all the names already announced in the "JOURNAL") to which we have added the names of the officers so far appointed and the Area headquarters addresses (some of which are still only temporary). *Denotes part-time members.

Gas Council.—Mr. A. E. SYLVESTER, F.C.A. (Chairman); Colonel H. C. SMITH, C.B.E., D.L., J.P. (Deputy Chairman). Staff appointments: Mr. F. G. BREWER, M.A. (Secretary); Dr. A. B. BADGER (Industrial Relations Officer). Offices: 1, Grosvenor Place, S.W.1. Telephone: Sloane 5457.

Scottish Gas Board.—Sir ANDREW CLOW (Chairman), Governor of Assam, 1942-47. Chairman of Committee on Domestic Peak Load. Mr. D. D. BURNS (Deputy Chairman), General Manager. Glasgow Corporation Gas Department. Mr. D. D. MELVIN, Manager, Edinburgh Corporation Gas Department. Mr. C. MURDOCH, J.P., General Secretary, Scottish Trades Union Congress. Chairman of Scottish Board for Industry. *Mr. J. CAMPBELL, M.B.E., Scottish Regional Gas Officer, Ministry of Fuel & Power; formerly Manager & Engineer, Dunfermline Gas Department. Offices: 51, Cockburn Street, Edinburgh, 1.

Northern Gas Board.—Mr. E. CROWTHER (Chairman), General Manager and Chief Engineer, Newcastle-upon-Tyne and Gateshead Gas Company. Mr. J. R. BRADSHAW (Deputy Chairman), B.Sc.Eng. (London), Engineer, Manager and Secretary, Hartlepool Gas & Water Company. *Lt.-Col. H. HASWELL PEILE, T.D., Director, Shotley Bridge and Consett Gas Company. *Alderman C. R. FLYNN, O.B.E., J.P., Member, County Borough of Gateshead. *Mr. H. A. SISSON, O.B.E., M.A., F.C.A., Chartered Accountant, Newcastle-on-Tyne. *Mr. J. J. ADAMS, O.B.E., Director & General Manager, West Cumberland Industrial Development Co., Ltd. Member of Cumberland County Council. (Created a peer in the New Year Honours.) Offices: 30, Grainger Street, Newcastle-on-Tyne.

North Western Gas Board.—Colonel W. M. CARR, O.B.E., T.D. (Chairman), Chairman, United Kingdom Gas Corporation. Mr. A. HENSHALL (Deputy Chairman), Commercial Manager & Secretary, Manchester Gas Department. *Mr. E. W. TAME, O.B.E., J.P., Town Clerk, Birkenhead. *Councillor C. E. P. STOTT, Member of Manchester City Council. Offices: Bridgwater House, 60, Whitworth Street, Manchester, 1.

North Eastern Gas Board.—Dr. ROGER EDWARDS (Chairman), Director, Co-operative Wholesale Society, Chairman of Council of Industrial Design. Mr. G. E. CURRIER (Deputy Chairman), General Manager, Bradford Corporation Gas Department. Mr. A. MACDONALD, General Manager, York, Harrogate and District Group of Gas Companies. *Professor A. L. ROBERTS, Leeds University. *Mr. G. H. BAGNALL, Secretary, National Union of Dyers, Bleachers & Textile Workers. Secretary, National Association of Unions in Textile Trade. Staff appointments: Mr. FRANK W. ALLUM, A.C.A., A.C.W.A., Accountant. Mr. C. L. DAVIES, Acting Secretary. Offices: Room 301, Century House, South Parade, Leeds.

East Midlands Gas Board.—Mr. H. F. H. JONES, M.B.E., J.P. (Chairman), Director, South Metropolitan and South Suburban Gas Companies. Mr. SYDNEY SMITH (Deputy Chairman), General Manager & Engineer, Romford Gas Company. *Councillor S. J. PERRY, A.M.I.Mech.E., Councillor, City of Leicester. *Mr. E. D. A. HERBERT, O.B.E., M.A., Director & Joint Manager, William Hollins & Company, Ltd., Nottingham. *Mr. JOHN GREEN, J.P., Director of Thomas Firth & John Brown, Ltd., Sheffield. *Mr. FRANK LEE, Councillor of County Borough of Northampton. Offices: Millstone Lane, Leicester.

West Midlands Gas Board.—Mr. G. le B. DIAMOND (Chairman), Director, Engineer & General Manager, Rochester, Chatham & Gillingham Gas Company. Regional Controller, South-Eastern Region, Ministry of Fuel and Power. Mr. G. A. MATTHEWS (Deputy Chairman), Secretary, Birmingham & West Midland District of the National Union of General & Municipal Workers. Mr. A. W. LEE, General Manager, Birmingham Corporation Gas Department. *Mr. A. W. SMITH, C.B.E., F.C.I.S., formerly General Manager, Birmingham Corporation Gas Department. *Mr. C. G. SPRAGG, O.B.E., Workpeople's Secretary to the Midland Regional Joint Committee for the Building Industry. Staff appointment: Mr. F. H. CURETON, Secretary. Offices: Gas Offices, Edmund Street, Birmingham.

Wales Gas Board.—Mr. T. MERVYN JONES (Chairman), Town Clerk, Newport. Mr. R. S. SNELLING (Deputy Chairman), General Manager, Severn Valley Gas Corporation, General Manager, Newport Gas Company. Mr. E. M. EDWARDS, M.Inst.Gas E., A.M.I.Mech.E., Engineer & Manager, Port Talbot Corporation Gas Department. *Mr. W. JONES, C.B.E., Clerk to the Denbighshire County Council. *Mr. F. E. PRICE, Accountant & Partner in the firm of Alban and Lamb. *Alderman J. E. EMANUEL, Member, Neath Borough Council. *Mr. J. C. CLAY, Director, Cardiff Gas Light & Coke Company. Offices: 14, St. John's Square, Cardiff.

Eastern Gas Board.—Sir JOHN STEPHENSON, C.B.E., J.P. (Chairman), General Secretary, The Plumbing Trades' Union. Labour Adviser to the President of the Board of Trade. Mr. J. H. DYDE (Deputy Chairman), General Manager, Slough Gas & Coke Co., and Uxbridge & District Gas Co. *Mr. A. M. BAER, Chairman. M. J. Enthoven & Sons, Ltd. Director, Henry Gardner & Co., Ltd. *Mr. EDWARD WOODALL, Chairman, Tottenham & District Gas Company. Staff appointments: Mr. R. H. EPPS, Secretary; Mr. H. R. HAZELDINE, Chief Accountant. Offices (temporary): 15a, Abbeville Road, Clapham, S.W.4.

North Thames Gas Board.—Mr. M. MILNE-WATSON (Chairman), Governor, Gas Light & Coke Company. Mr. F. M. BIRKS, C.B.E. (Deputy Chairman), Deputy Governor & Managing Director, Gas Light & Coke Company. *Dr. E. V. EVANS, Managing Director, South Metropolitan Gas Company. *Mr. L. C. HANSEN, M.B.E., London Area Secretary of Transport & General Workers' Union. *Mr. G. D. DILLON, Director of Barton Mayhew & Co., Chartered Accountants. Staff appointments: Mr. BRIAN WOOD, M.A., Secretary. Offices: Gas Light and Coke Company, Kensington Church Street, London, W.8.

South Eastern Gas Board.—Mr. W. K. HUTCHISON, B.A., B.Sc. (Chairman), Managing Director, Gas Light & Coke Company. Mr. R. S. JOHNSON (Deputy Chairman), Solicitor & Controller of Services, Gas Light & Coke Company. *Mr. TOM BROWN, Managing Director, South Suburban Gas Company. *Mr. A. DALGLEISH, formerly National Secretary of the Engineering, Shipbuilding & Chemical Workers' Union. *Mr. K. W. HICKMAN, Director, Edward de Stein & Company, E.C.2. *Dame VERA LAUGHTON-MATHEWS, D.B.E., Chairman, Domestic Coal Consumers' Council. Chairman, Association of W.R.N.S. Staff appointment: R. H. SANDFORD SMITH, Secretary. Offices: Gas Light & Coke Company, Kensington, Church Street, W.8.

Southern Gas Board.—Mr. O. R. GUARD (Chairman), Managing Director, Associated Coal Wharves, Ltd. Director, United Drapery Stores. Mr. S. E. WHITEHEAD (Deputy Chairman), Managing Director, Southampton Gaslight & Coke Company. *Mr. R. P. CHESTER, J.P., Member, Hampshire County Council. Chairman, Hampshire Agriculture Executive Committee. *Mr. A. E. SMITH, Governing Director of Smith Luxury Coaches (Reading), Ltd. Councillor, County Borough of Reading. Offices: 166-174, Above Bar, Southampton.

South Western Gas Board.—Mr. C. H. CHESTER, O.B.E. (Chairman), Director, General Manager and Secretary, Swindon United Gas Company. Mr. E. R. V. PORTER, O.B.E. (Deputy Chairman), Divisional Organizer, Amalgamated Engineering Union. Vice-Chairman, South-Western Regional Board for Industry. *Mr. A. W. GRANT, C.B.E., Chairman, Engineering & Allied Employers West of England Association, Bristol. *Mr. H. V. SLADE, M.B.E., J.P., Chairman and Managing Director, Garrard Engineering & Manufacturing Co., Ltd., Swindon. Staff appointments: Colonel W. N. CURTIS, Secretary and Solicitor; G. F. OLIVER, Planning Engineer. Offices: 43, Regent Street, Swindon.

Personal Notes

Mr. J. R. BRADSHAW, B.Sc.Eng.(Lond.) (Deputy Chairman, Northern Gas Board), served his apprenticeship with the Accrington District Gas and Water Board and has held in succession the following appointments:—Chief Assistant Engineer of Doncaster Corporation Gas Department and of Barrow Gas and Water Department, Engineer and Manager of Retford Gas and Water Department, Chief Engineer of Plymouth Corporation Gas Department. Since 1927 he has been Engineer, Manager and Secretary of the Hartlepool Gas and Water Company. In 1931 he was President of the North of England Gas Managers' Association.

Mr. ALEXANDER MCDONALD, B.Sc., A.R.T.C., A.R.I.C., M.Inst.Gas E., General Manager, York, Harrogate & District Group of Gas Companies (full time member of the North Eastern Gas Board) was educated at Allan Glens School, Glasgow, Royal

Technical College, Glasgow, and Glasgow University. Starting his career in the gas industry with Motherwell & Wishaw Corporation Gas Department in 1924, Mr. McDonald was appointed Deputy Engineer and Manager in 1930 and Engineer and Manager in 1931. He became Engineer, General Manager, and Secretary of the Castleford Group of Gas Companies in 1938, and in 1944 General Manager of the West Riding Group of 15 gas undertakings, which absorbed the Castleford Group. In the following year he was appointed Director and General Manager of the York, Harrogate & District Group of Gas Companies, which position he still holds. He has given a number of technical papers to the various gas associations, three of which have been concerned with centralization and grouping. A member of the Council of the Manchester District Association of Gas Engineers, Mr. McDonald is also a member of the Central Board of the British Gas Council, and Vice-Chairman of the Yorkshire District of the British Gas Council. He has always been keenly interested in Junior activities, being a past President of the Scottish Junior Gas Association (Western District). He was also Senior Vice-President of the North British Association of Gas Managers in 1938 when he left Scotland for Yorkshire.

Mr. SYDNEY SMITH (Deputy Chairman, East Midlands Gas Board) received his training with the Bradford Corporation Gas Department and later became a General Works Assistant at their various stations. In 1923 he was appointed Technical Assistant to the Birkenhead Corporation Gas Department and in 1928 became Deputy Engineer and Manager at Dunfermline. He was appointed Assistant Gas Engineer and Manager at Bristol and in 1939 became Engineer and Manager at Paisley. In 1945 he was appointed General Manager and Engineer to the Romford Gas Company.

Mr. FRANK W. ALLUM, A.C.A., A.C.W.A., who has been appointed Accountant to the North Eastern Gas Board, is at present Secretary and Assistant General Manager of the York, Harrogate, and District Group of Gas Companies. Mr. Allum entered the gas industry in 1932 as Assistant Accountant to the Brighton, Hove, and Worthing Gas Company after serving his articles with a London firm of chartered accountants. In 1939 he was appointed Secretary of the Harrogate Gas Company and in 1944 Secretary of the York, Harrogate, and District Group of Gas Companies. In January, 1947, Mr. Allum was appointed Secretary and Assistant General Manager of the Group. In addition to being an Associate Member of the Institute of Chartered Accountants and Associate Member of the Institute of Costs and Works Accountants, Mr. Allum is an Associate Member of the Institute of Industrial Administration.

Councillor S. J. PERRY, A.M.I.Mech.E., (part time member East Midlands Gas Board) is a Councillor of the City of Leicester and was President of the British Commercial Gas Association. He accepted that office in 1943, and held it for three years until the B.C.G.A. was merged with the National Gas Council to form the British Gas Council.

Dr. E. V. EVANS, O.B.E., who has been appointed a part-time member of the North Thames Gas Board, is at present a Joint Managing Director of the South Metropolitan Gas Company and a Director of the Brighton, Hove, and Worthing Gas Company. At the end of 1947 Dr. Evans, after completing nearly 50 years' service as an officer of the South Metropolitan Gas Company, retired from the post of General Manager of that Undertaking, but continues to perform the duties of that office. He has occupied in turn the posts of Chief Chemist (1907), Chief Chemist and Products Manager (1920), and General Manager (1937). He was President of the Institution of Gas Engineers in 1942 and as one of three people who negotiated the formation of the Gas Research Board became its first Chairman in 1939, occupying this office until 1947. Dr. Evans's consistent aim has been to apply scientific methods to the carbonization of coal and the treatment and use of its products and he has done much to foster the close association between the gas industry and the chemical industry. In the 1914-18 war he played a leading part in developing chemical raw materials from coal carbonization for the use of the Ministry of Munitions and was awarded the O.B.E. (Civil Division) in 1918. In 1938 he was Chairman of the Association of British Chemical Manufacturers and held the office of President of that Association from 1943 to 1945. He has served on the Fuel Research Board, the Road Research Board, is at present a member of the Fuel Efficiency Committee of the Ministry of Fuel and Power, and is President of the newly-formed Coal Tar Research Association.

Mr. R. P. CHESTER, J.P. (part-time member of the Southern Gas Board) has been Chairman and Managing Director of Donald Macpherson & Co., Ltd., since 1923, having joined the Company in 1910, after serving his articles as a gas engineer under Mr. J. H. Brown, then Chief Engineer of the Nottingham Gas Department. He takes a very active part in Hampshire county affairs, and the nationalization of the gas industry is the second big "take-over" in which he has participated, for on July 5, 1948, when all the hospitals in the country were taken over he became Chairman of the Park Prewett Hospitals Management Committee, No. 47 Group of the South-West Metropolitan Region.

Allocations to Area Boards

The British Gas Council has issued to its member undertakings a note of alterations made by the Ministry of Fuel and Power to the provisional allocation of gas undertakings to Area Boards under the Gas Act, 1948, since the provisional list was issued on Jan. 1. It should be noted that the world "Area" does not form part of the name of any of the 12 Boards. The alterations are as follows:—

Delete:—the following undertakings shown as ancillaries:—

Scottish Gas Board:—Arniston (Colliery), Newtongrange (Lothian Coal).

Northern Gas Board:—Brancepeth Colliery, Ferryhill, Lanchester.

North Western Gas Board:—Crewe.

North Eastern Gas Board:—Sheply (Seth Snr.).

East Midlands Gas Board:—Denaby, Sheepbridge, Stavely (Hollingwood), Wolverton.

Wales Gas Board:—Bute Docks, Tondu.

Eastern Gas Board: Melton Constable.

Southern Eastern Gas Board: Ashford (Railway).

South Western Gas Board:—Downside Abbey Gas-Works, Oakhill Brewery Company Ltd., Gas-Works, Princetown (H.M. Prison) Gas-Works, Radstock Colliery Gas-Works (N.C.B.), Sharpness Gas Undertaking (Statutory), Swindon (Railway).

Amend:—"Gloucester Gas Light Company" (South Western Area—Statutory Companies) to read "Gloucester Gaslight Company."

Delete:—"Brough, Elloughton and District Gas Company Ltd." from the list of Statutory Companies in the North Eastern Gas Board.

Insert:—"British Gas Light Company Ltd. (Brough Elloughton Station)" in the list of Non-Statutory Undertakings vesting in the North Eastern Gas Board.

Consequential amendments should be made to the Summary.

Notes:—(i) Notices under the Gas (Notices) Regulations, 1948 were not served on all persons carrying on the non-statutory undertakings shown in the list, as some of these non-statutory undertakings are carried on by statutory undertakers. (ii) Of the five Joint Boards included under the heading "Local Authority Undertakings," only one (Accrington District Gas and Water Board) is a local authority for the purposes of the Gas Act, 1948 (as defined in Section 74(1)). The other four have no function other than as statutory undertakers. (iii) All stations (whether statutory of non-statutory) of the British Gas Light Company will, in the first instance, vest in the Eastern Gas Board, irrespective of the areas in which the undertakings are situated. This does not apply also to subsidiary companies of the British Gas Light Company.

THE MUTUAL ASSOCIATION

At the first annual meeting of the Mutual Association (an organization of coal carbonization officials and technologists in County Durham), at Durham, Mr. J. D. Murray, Labour M.P. for Spennymoor, referred to development plans in the county proposed by the National Coal Board. He stated that reconstruction plans were in progress at 19 collieries in the county and similar plans were being considered for a further 15 pits. Referring to carbonization, Mr. Murray stated that the cost of plant of this kind had increased three-fold since 1939. Before nationalization the organization of carbonization was hopelessly confused. With the nationalization of steel, there would be for the first time a framework within which there could be effective co-ordination for the development of carbonization. Mr. Murray said that the only coal this country exported should be steam coal. They should certainly not export the best coking coal for the buyers abroad to reap the benefit of the by-products.

Mr. E. F. Thompson, of Shotton Colliery (Secretary of the Association), said that the scientist was under-rated by the Coal Board. He also said that they had heard of uneconomic coke-works as well as uneconomic collieries, and referred to a coking plant in County Durham which had been allowed to deteriorate because of the prospects of it being taken over by the State. Mr. Thompson added that the public had not heard enough about carbonization and about the job of the men who worked there.

The first president of the Association is Mr. Percy Robinson, of the Bankfoot Coke Works, Crook.

The British Oxygen Company are again offering a welding prize of £100 in the hope that some welding research will be forthcoming. No award was made in 1948-1949.

TEN YEARS' EXPERIENCE OF A TWO-PART TARIFF

FOLLOWING is a report of the discussion on the paper on "Ten Years' Experience of a Two-Part Tariff," which Mr. Davis and Mr. R. F. Layton, of the South Metropolitan Gas Company, presented at a meeting of the Southern Association of Gas Engineers and Managers (Eastern District) at Gas Industry House on Jan. 25. The paper was published in the "JOURNAL" last week (pp. 301-305).

The **Chairman** (Mr. W. K. Tate, Portsmouth), having extended a cordial welcome to the President of the main Association (Mr. L. P. Ingram, Taunton) said the paper described one of the most courageous and successful experiments of its kind that had ever been made, and the South Metropolitan Gas Company could not have found anyone better able to describe this fundamental alteration in its gas pricing arrangements. Mr. Davis was invariably a master of any subject which he handled, and in his charming manner he had made the introduction of this far reaching change seem very easy. In asking his friends in the industry to present papers during the year of his Chairmanship he (Mr. Tate) had striven as far as possible to choose subjects which he felt were of vital interest at the moment or subjects to which they would soon have to turn their minds for the survival of their industry. It was a little disappointing to read early in the paper that the most opportune time to introduce a promotional tariff was when business was increasing and revenue was growing more rapidly than expenditure. In these days of inflation that was not a likely occurrence for some years to come. Nevertheless, a tariff system of charge was inevitable for the industry's salvation, and with the coming of the Area Gas Boards and the larger units that would be set up there would be much more opportunity for their implementation.

He felt that notwithstanding the favourable effects of a tariff or of any system of pricing gas the salvation of their undertakings would depend not only on that, but on the service they rendered to their consumers.

Colonel **F. J. Bywater** (South Metropolitan Gas Company), in opening the discussion, said he was Controller and District Manager of the Company at the time the tariff was introduced and was closely associated with the authors in its preparation from its inception. From that vantage point it gave him real pleasure to pay his tribute to the extraordinarily hard and efficient work which they and other officers of the Company carried out in helping to establish the tariff on a sound and successful basis. Most of them knew Mr. Davis and his almost unrivalled knowledge of the technical and practical side of fuel services. His joint author, Mr. Layton, was probably not so well known to the members, but his actuarial brain worked like a gimlet and he had a thoroughly sound knowledge of the economics of gas supply. Mr. Davis and Mr. Layton found an ideal nucleus of a small committee of officers which was established in the company to study the problem. With them were associated Mr. H. M. Browne and the late Mr. Ernest Stredwick, who brought to their deliberations most valuable practical experience of district conditions. They were joined at times by other divisional and industrial managers, so that while basing their work on what they hoped were sound technical and statistical lines they always kept their feet firmly on the ground of practical experience.

Carefully Drawn Plan

His own position was to watch carefully, to sit in with them occasionally, to help as much as he could, and, he hoped, give them all the encouragement he could, but they did the work. All the time, however, they were working to a plan which they had carefully drawn up. Before speaking about the plan of campaign, brief reference should be made to the background on which they were working. It would no doubt be remembered that in 1936 the late Dr. Charles Carpenter, after studying the question for some time, decided to introduce a compulsory three-step system of charge for the purpose of dealing with unremunerative consumers, and with sound promotional elements to extend the use of gas in what the authors had rightly described as a closely built-up area. Statistically and in justice and equity it was generally agreed that that tariff was perfectly sound, but under it the price of gas to the small and unremunerative consumer was raised considerably, and that proved a great hunting ground for the popular Press so that, eventually, as they knew, the tariff had to be withdrawn.

But they could not stand still, and so they immediately set to work again and started afresh to consider the problem. As the authors had explained, after careful consideration they rejected both block and step tariffs as unsuitable and decided without hesitation to try to work out a voluntary two-part tariff. The information which had been collected for the previous tariff was supplemented by enquiries such as the authors had described and the small committee he had already mentioned set about analyzing and codifying all that information. He himself had considerable interest and responsibility for any scheme that was put into operation, for it was obvious that under the conditions which faced them the flat rate could not help them to develop, and they had to decide how far they could afford a definitely promotional tariff without endangering their finances.

Their plan was roughly this: They knew from their cross-section enquiries and the system of classification which was established, as described in the paper, approximately what sort of consumption was taking place in each class, and, from the Divisional Managers, they knew what development might be expected with gas at the right price. They knew also what those consumers were paying for their gas at that time. They were able, therefore, to establish, as they had heard, a parity line of charge. That price had to be made up of a Standing Charge and a Commodity Charge.

The Parity Line

As had been explained in the paper, they decided to make the latter—the Commodity Charge—half the flat rate, and make up the difference to the parity line with a Standing Charge, estimated as simply as it could be devised. Various methods were adopted to deal with the different classes of consumers. Some of them might cause them to wonder how they were arrived at, but in round terms the method was simple. They knew what the consumer was paying for his gas, in the case of the domestic consumer—the number of rooms in his house, and in the case of industrial premises and restaurants, &c., what appliances were installed, and by trial and error it was not very difficult to establish data for each class on which the Standing Charge could be based.

These were set out in the paper, and as had been emphasized it was most important never to vary this basis of charge, and to treat alike every consumer in each class. Some consumers, of course, would not immediately benefit by adopting the tariff, and it required good staff work on the part of District Representatives to persuade them to do so in the anticipation that by increased use of gas and installing new appliances they would soon come into benefit; while, of course, those above the parity line benefited at once and became good advocates of the tariff. A number of such cases had to be carefully considered. As a public utility undertaking the Company had, of course, to publish the tariff and it was found as had been anticipated that they had full control and could "put in the clutch" as fast as they chose according to the canvassing carried out.

As would be seen from the figures quoted in the paper, the number of consumers now taking gas on the tariff was not yet as embarrassing as the quantity of gas sold to those consumers, but the serious interruptions and difficulties encountered since its inception ten years ago—the war years, shortages of men and material, of coal, carbonizing plant, and appliances of all kinds—all these things had been a serious handicap to development. Nevertheless they had seen enough to be as sure as one could be in these days that they had been working on the right lines, that the tariff was under full control and was not likely to lead them to undertake peak loads at cheap rates which would embarrass them. In other words, financially it was sound; there was no longer a large number of unremunerative consumers; and the system would lead to development. They therefore considered it had been a great success, and it had remained practically unaltered, with only small adjustments, since its inception.

Heat on Tap

If anything had emerged clearly in this post-war world in the industry it was that "heat on tap" had a great future, and that if they could produce gas and distribute it to efficient and up-to-date appliances at a reasonable cost, the potential of development was enormous. As he saw it development could take place in many ways—in the home, by increased amenities and the displacement of solid fuel; in shops, offices and factories by the increased use of thermostatically controlled space heating appliances; and in industry by the adoption of new forms of gas-fired furnaces and possibly in the not too far distant future the application of the gas turbine, all again to displace solid fuel. All this presupposed that the price at which gas could be supplied was competitive, so that production, distribution, and sales must operate as a well co-ordinated machine. If this was done he thought they might look forward to the future of the gas industry with the greatest possible optimism.

Mr. **Stirling Everard** (Gas Light and Coke Company) said he agreed with everything the authors had said; as a matter of fact, his agreement was so complete that he could see no difference between the north and south of the Thames except that the south had more trams. He had never felt that they could claim equity for a variable standing charge based on the number of rooms or on the rateable value. He knew it was common practice in the electricity industry, but he was not convinced by that fact. He agreed closely with the authors on the point that gas consumption went up more steeply with an increase in the number of people in a home than with an increase in the number of rooms. The effect

of the present system was that a family of a given size—say, five in all—obtained its gas more cheaply in a small house than in a larger one. That might be quite right in principle, but it did not go far towards the ideal of relating charge to cost of supply.

Mr. **Layton** replied that they must have some basis of assessment; they could ascertain the floor area or the number of rooms, but they could not always check the number of people who lived in a given home. They could not keep in touch with the registrar of births and deaths for that purpose, but they could ascertain the number of rooms occupied. There could be no such thing as an exact assessment.

Mr. **Everard** said his real point was to urge that there should be a fixed charge which did not vary between one consumer and another. The cost of supplying gas was the same whether there were five rooms in a house or four.

Mr. **Layton** said the question of the number of people in a house was only one aspect. The three-step tariff had failed because it was automatic and too broad in its application.

Mr. **Davis** said it was true, as Mr. Everard had remarked, that there was no difference in the cost of supplying gas to a five-roomed house, compared with four rooms. The majority of their consumers in South London lived in part-houses, and the cost of supplying gas to a part of a house was definitely less than the cost of supplying to a whole house, and there was therefore some justification for basing the charge on the number of rooms. Something like three-fourths of their consumers were on a pre-payment basis, and the standing charge must be something which did not frighten them.

An Ever-Present Danger

Mr. **W. Johnson** (Wandsworth) said he could confirm one point that the authors had made in regard to tariffs, and that was one of the principal objections to tariffs, namely, that there was always a danger that somebody was going to get gas at an uneconomic rate. Although such circumstances could arise, they did not, generally, seem to do so. In the section of the paper dealing with the principles involved in producing tariffs there was a long discussion of the reasons for tariffs, but surely the real purpose was to devise a system of charge which would encourage people to use a little more gas than the average. On the question of the form of the tariff there were two matters to be borne in mind. Where there were considerable variations in demand over the year the two-part tariff was probably the best way of levelling up the unevenness of demand. The basis of the tariff also facilitated the calculation of potential demand, for example, in the case of heating and hot water. In the case of hospitals the number of beds was a very useful basis of assessment. There were a number of consumers who, no matter what the price inducement might be, would not burn more than a certain amount of gas.

Circumstances were different in the case of industrial utilization. An industrial consumer might introduce a new process of manufacture and suddenly increase his consumption ten-fold—a thing that could not occur with any other class of consumer and was not likely to occur in more than a small percentage of cases in the industrial field; nevertheless, a two-part tariff with a very low commodity charge might be a dangerous thing, and for that reason he was a strong advocate of the block charge. In principle the block charge and the two-part tariff were fundamentally the same. They both had their uses, and his Company had used both systems with great satisfaction. So far as heating and hot water were concerned, business had grown beyond anything they had imagined. Reverting to the domestic consumer, the authors had stated that the cooking load could be readily obtained if the price of a therm of gas was one-third the price of one cwt. of coal. There should be general agreement with that statement. As a matter of fact one therm of gas was equivalent to about five therms of solid fuel, taking everything into account—price, convenience, saving of labour, &c. To secure and retain the water heating load the price of gas had to be something more competitive because the efficiency of the solid fuel-fired boiler was much closer to that of the gas-fired water heater. To a limited extent a similar argument would apply to space heating. So far as the domestic consumer was concerned he thought the South Metropolitan Company had done a very good piece of work for which the industry ought to be grateful. They were also on the right lines in regard to industrial consumption.

Mr. **Layton** explained that having graded the different types of appliances in use they had learnt a great deal about the consumption they might expect to get, and their average price was worked out with a rather surprising uniformity.

Price Too Low?

Mr. **J. W. Townsend** (Tunbridge Wells) observed that the average price of gas sold on the tariff was stated to be 4d. per therm cheaper than the flat rate, and 3d. per therm cheaper than the average for the whole of the Company's consumption. There were 15% of the consumers on the tariff. What would happen to the tariff price if and when, say, 50% of the consumers went on to the tariff? Would not the commodity charge then have to be increased to maintain sufficient revenue? It seemed to him that a price of one shilling a therm was too low in present circumstances, with capital costs of plant and mains rising at such a colossal rate. One wondered whether the war and the increase in prices necessitated by the war might not have helped the Company in enabling it to increase the commodity rate as the consumption increased. It would be interesting to see the history of the rise in costs that had taken place in the ten years since the introduction of the tariff. Circumstances had changed a great deal since 1939, and he suggested that the uneconomic consumer of to-day was the old age pensioner and the occupant of a single room, who should be subsidized by other consumers.

Mr. **Layton,** replying to the question about the effect of a larger percentage of consumers going on to the tariff, said that both the flat rate and the commodity rate were adjusted from time to time, and so were the standing charges, and there would be no real difficulty in adapting the charges to such changed circumstances. While it was true that the war had wrought many changes it did not appear to have altered the general economic considerations.

Mr. **Davis** replied to Mr. Townsend's point about the unremunerative consumer by pointing out that in some cases old age pensioners in single rooms were burning up to 400 therms per annum and were taking full advantage of the labour-saving effects of gas heating.

Mr. **L. C. S. Poulter** (Gas Light and Coke Company) said that probably one of the first things one did on perusing a paper of this kind was to see how it compared with practice in one's own undertaking, and he was bound to say he shared some of the thoughts which had been expressed by Mr. Townsend. Clearly the paper could not tell them what the gas making plant position was in 1938 and what margin of plant was available for meeting increasing loads. Under present circumstances many undertakings were in such a position that if they were faced with a severely cold spell they would be hard put to it to meet the demand. Just at the moment, however much they might wish to introduce a tariff on a large scale, they were unable to do so, and he did not know whether it was possible for them to say how they stood with regard to increased output with the plant that was available. He looked forward to the time when the gas making situation, and the financial situation, would enable them to push gas sales. Naturally they would rather sell 200 therms than 100 therms to an individual consumer. If they wanted to extend their sales in a big way it must be by the two-part tariff.

Mr. **Davis** agreed that the plant capacity and present output problem was an embarrassing one; nevertheless they wanted to go ahead. Another important aspect was that there was a great deal of re-building going on, and if gas did not get in at the outset there would be little chance of getting business in the future. They could not hold up development just because it was inconvenient, although he admitted that matters were quite awkward on the manufacturing side at present.

Mr. **R. Prince** (Brighton), proposing a vote of thanks to the authors, said the paper would be invaluable to those who were contemplating introducing a tariff in the near future.

Mr. **C. J. Sawbridge** (Eastbourne), who seconded, said that from a hasty calculation he had made after glancing at the paper it seemed that for certain classes of consumers there was very little difference in ultimate cost between the tariff and the flat rate. He suggested that the commodity rate should be related to the cost of gas into holder.

Mr. **Davis,** briefly acknowledging the vote of thanks, said it had been implied by some of the speakers that some of the statistical data was somewhat theoretical. It was essential to have all the available data in order to know where they were going, otherwise a tariff could be an exceedingly dangerous thing.

METRO ROAD TAR SERVICE

The South Metropolitan Gas Company has produced an interesting brochure entitled "The Service Offered with Metro Road Tar." As its name implies, it is to assist customers to use tar to the best advantage. This technical service is based, after much research work, on the fact that the performance of a tarred road depends even more on the methods by which the tar is used than on the properties of the tar itself.

The brochure contains much detailed and interesting information. It deals in turn with Metro road tar and Metrix, surface dressing, tarmacadam and tar carpets, and other uses. It explains how every delivery of tar is tested and checked before being sent out. This ensures that the viscosity is correct. In addition, average samples are regularly subjected to the full range of British Standard tests, which are required by the Certification Trade Mark Scheme of the British Road Tar Association.

The Company has a fleet of modern tar-spraying vehicles. They are built to their own specifications and special care is taken to control the rate of spread of tar on the road.

The book gives a good description of the scope of this service and was produced by the Products Department of the South Metropolitan Gas Company, Regis House, King William Street, E.C.4.

REMOTE CONTROL OF A HOLDER STATION

SUPPLIED FROM A HIGH PRESSURE GAS GRID

THE efficient and economic control of gas supplied from a high-pressure grid system to a number of holder stations is something of a problem. The capital cost and running cost of compressing plant make it necessary for such plant to be used with the best possible hourly and daily load factor. For the same reasons it is, of course, equally important to achieve the best possible seasonal load factor, but that problem requires different treatment.

It is theoretically possible to run grid compressing plant at a virtually 100% hourly and daily load factor, providing it can be arranged for each holder station supplied by the grid to take gas at a constant volume flow over the 24 hours of each day. This, however, is rarely, if ever, possible in practice for one or more of several reasons. It is usually the case that some of the holder stations are short of "useful" storage capacity, thus necessitating some variations in the rate of input from the grid. Again, in many cases it has been necessary to give direct supplies to villages through high-pressure governors, and the variation in flow through these governors can materially affect the operation of the compressing plant at peak load periods. To meet these conditions it is usual for the rate of flow into various stations to be altered from time to time to the instructions of a central control room where decisions depend on the availability of reliable information about the changing conditions at all the holder stations supplied. To make this information available and to arrange any resulting operation can be uneconomic and wasteful in manpower, particularly at those many holder stations which do not justify for other purposes the employment of even a part-time attendant who, incidentally, is usually not available when most required.

To overcome these difficulties and to achieve the most economic operation of grid holder stations and at the same time to improve the compressing plant load factor, the Sheffield and District Gas Company has recently installed at its Dronfield holder station the first of what is planned to be a series of remote control and indication units covering all stations supplied by the high-pressure purified gas grid.

The Dronfield holder station is approximately seven miles from Sheffield and supplies 2,900 consumers with approximately 250,000-300,000 cu. ft. of gas per day. At the station is a single life spiral guided holder of 100,000 cu. ft. capacity.

The basic design principle of the control system which has been installed is that knowledge of essential conditions at the station shall at all times be available in the central control room at Sheffield and that the supply of gas from the grid be controlled by a variable volumetric governor which can be operated from the central control room through a range of full flow to complete shut-off, thus eliminating the use of a separate electrically-operated valve. The information and facilities considered necessary were:

For the Control Room:

1. Holder stock with high and low limit alarms.
2. Rate of flow from grid into station.
3. Control of flow through volumetric governor.
4. Pressure available from grid at inlet of volumetric governor.
5. Telephone communication.

At Dronfield Holder Station:

1. Flow recorder and integrator.
2. Pressure recorder.
3. Telephone communication.

Volumetric Governor

The volumetric governor installed is designed to control the flow into the holder at any rate up to a maximum of 15,000 cu. ft. per hour. The inlet pressure range is 1½ to 15 lb. per sq. in., and the outlet pressure is constant at 4 in. w.g. as the holder is of the single lift type. The standard Donkin volumetric governor is used, which is based upon the Reynolds governor arranged with a gas-loaded auxiliary bowl and with a pilot volumetric governor in the relay system which controls the flow by regulating the differential pressure across an orifice. The general arrangement is shown in Figs. 1 and 2. An orifice is arranged on the outlet of the main governor, which is fitted with a grid to straighten the flow and as far as possible to cut down the turbulence created by the passage of the gas through the main

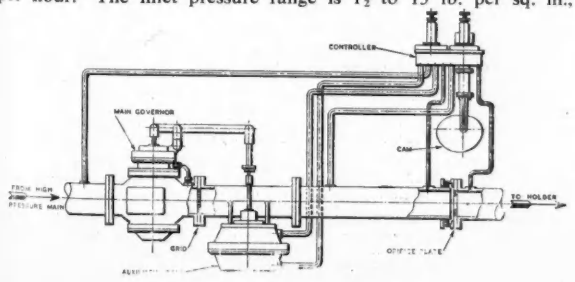


Fig. 1.—Volumetric Control.

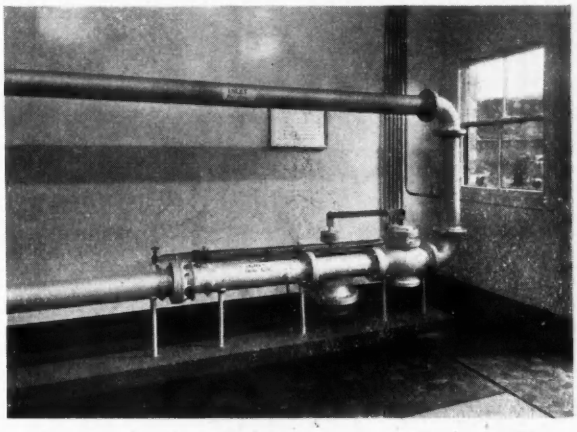


Fig. 2.—Showing the volumetric governor installation designed to control the flow into the holder at any rate up to a maximum of 15,000 cu.ft. per hour.

governor. The diaphragm of the pilot volumetric governor is connected across the orifice so that if the differential pressure exceeds that required to give the desired flow, the pilot governor tends to close and in turn this partially closes the main governor.

The volumetric governor, therefore, controls the flow irrespective of variations of inlet (or, if necessary, outlet) pressure, and by closing the pilot governor completely the governor is capable of serving as a shut-off valve. The pilot governor is weight-loaded for the maximum differential pressure required to give the maximum volume, and it is unloaded by means of a spring fitted on the under-side which is actuated by a cam which is turned by an electric motor suitably geared and controlled by the remote-control equipment. The panel containing the relay equipment, pilot volumetric governor and operating cam is shown in Fig. 3. In the wall can be seen the box which houses the electric operating motor.

The cam at present in use was designed to give control of the differential pressure across the orifice so that equal movements of the cam result in equal changes in the pressure head. As the flow varies as the square root of the pressure head it will readily be appreciated that the control is very much finer at the high flow rates than at the low. This has been found to be rather a disadvantage in practice, and a new cam is in course of preparation designed to give equal steps in terms of volume instead of differential pressure.

Remote Indication and Control

The system used is the Automatic Telephone and Electric Company's system of supervisory remote control, using a single pair of G.P.O. telephone wires connecting the holder stations to the central control room in Sheffield.

This system is one which has been well tried over the past 20 years in the field of electricity generation and distribution, and is widely used for the control of the electricity grid system. Somewhat similar equipment, for indication, has been embodied in the Company's crude gas grid control system from its origin.

The basic principles of the system may be described, very briefly, as being analogous with those used in automatic telephony. A common signalling group is installed at each end of the pair of pilot wires, and these are arranged for the dual purpose of (a) generating electrical impulses and (b) for the reception of them; in addition, it contains apparatus for distributing the various services at the remote end, and for connecting them to the appropriate indicators and/or instruments at the control room. An impulse is generated by momentarily connecting

a battery to the pilot wires, the positive pole to one wire and the negative pole to the other. This causes what is termed "normal" impulse to be transmitted over the wires; when the poles of the battery are reversed and connected momentarily to the wires, a reverse impulse is transmitted. The system is virtually based on the transmission of a number of these impulses in a continuous

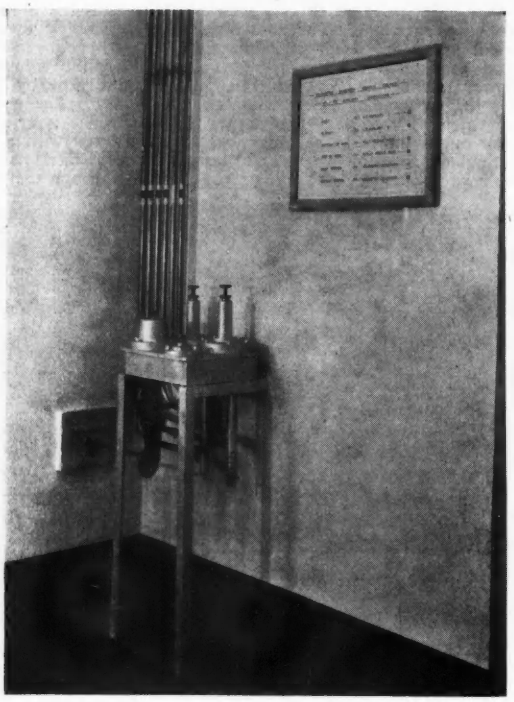


Fig. 3.—The panel containing the relay equipment, pilot volumetric governor and operating cam. On the wall can be seen the box which houses the electric operating motor.

train. The total number of impulses in the train is fixed for a particular scheme, but the number and order in which the two kinds of impulses are sent is varied to provide a code for selection and discrimination purposes.

Method of Control

The control is actually carried out from the small panel shown on Fig. 4 which is fitted in the control room in Sheffield. The panel contains three identical horizontal-edgewise instruments and these are suitably calibrated to read:

(a) Gasholder stock.
(b) Gas flow.
(c) Gas pressure.

In addition a mimic schematic diagram of the station layout is arranged on the panel, and the various push buttons and lever switches for selection and operation are incorporated, in this panel near the symbols representing the relevant equipment or near the relevant indication instrument if this is to be selected.

The house telephone type signalling apparatus is housed in a separate cubicle and is connected to the panel by means of a multi-core cable. A cubicle at Dronfield houses similar signalling apparatus.

Gasholder stock is indicated on the top instrument of the panel and the reading is virtually continuous. Fig. 5 shows part of the mechanism and the transmitter at the holder. A change in height of the holder is converted into a rotation of the drum associated with the transmitter, and by means of a suitable gearing the drum is coupled to an electrical coding mechanism. This arrangement is such that the coding mechanism is rotated through 360° for the complete range of height or stocks required. When a change in stock occurs which is greater than the pre-determined amount, a coded train of impulse is transmitted to the control room automatically; here the train is stored by means of telephone type relays which are arranged to alter the resistance of an ordinary milliammeter circuit. A milliammeter in the circuit reads the current which is proportional to the holder stock.

The limit alarms are initiated by means of specially designed trip switches which are actuated by bars fitted to the holder itself. Audible and visible alarms are given at the control panel when the high or low limit is reached. The holder is represented on the panel by a plate containing a window having three sections which can be illuminated separately as follows:

Top section	Red—Nearly full.
Middle section	Amber—Partly filled.
Bottom section	Green—Nearly empty.

When the holder stock reaches the high or low limit the red or green lamp flashes and the amber light goes out. The flashing is accompanied by the ringing of the alarm bell. This may be changed to a steady red or green glow by operating the alarm re-set key on the panel, and the operation of this key also cuts off the ringing of the bell.

The rate of flow of gas into the station is shown on the middle indicating instrument on the panel. The reading is obtained on demand by momentarily depressing the appropriate selection push button. When selected the reading may remain displayed and when the pilot wires are required for another purpose, the reading is disconnected for short periods varying from five to ten seconds and when that other operation is completed the reading is automatically resumed.

The flow transmitter used is of the Electroflo ring-balance type which converts the change in gas flow to a change in the resistance of an A.C. circuit. For the purpose of remote indication a

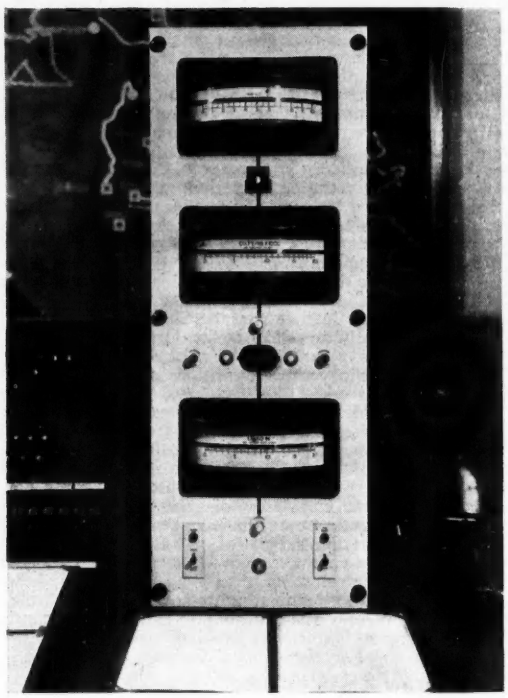


Fig. 4.—The control is carried out from the small panel shown here which is fitted in the control room. The panel contains three identical horizontal-edgewise instruments and these are suitably calibrated to read: (a) gasholder stock; (b) pressure flow; (c) gas pressure.

quadrature current transformer is inserted into the circuit and its output rectified. When the reading is selected, this D.C. current is connected to the pilot wires and the appropriate indication instrument is connected on the control panel.

The bottom instrument on the panel reads pressure of gas available at the inlet of the volumetric governor. This is of a similar type to that described for flow reading, and readings may be obtained in a similar manner. The transmitting device in this case is an Electroflo manometer capable of working at a maximum pressure of 20 lbs. per square inch. The panel gives two continuous readings—holder stock and either flow or pressure. Should the pressure reading be normally displayed the momentary pressing of the flow selection button automatically disconnects the pressure reading in addition to selecting the flow reading. When selected, the flow reading "takes possession" of the pilot wires until they are required for some other purpose, *e.g.*, the transmission of an impulse train or telephone connection. The reading is, however, restored immediately the pilot wires are released. The normal operating procedure is to indicate continuously holder stock and pressure since the flow remains constant at the rate selected.

The annexe containing the transmitting equipment is shown in Fig. 6. This shows the pressure manometer on the right

hand wall and underneath the other end of the box containing the cam-operating motor shown in Fig. 2. On the back wall can be seen the ring-balance meter, and through the window the cabinet containing the combined flow and pressure recorder with the flow integrator above.

The method of altering the rate of flow into the station by varying the loading of the small pilot volumetric governor on the relay panel at Dronfield has already been described. The remote control of this is carried out in steps, being roughly as follows:

The governor-controlling device is first selected by operating a selection key on the control panel adjacent to the governor symbol. This is followed by a control operation which may be either to increase or decrease the flow and is effected by momentarily operating the appropriate push button. This momentary operation of pressing the button causes the electric motor which turns the cam of the pilot volumetric governor to run for a predetermined fixed period—the cam being turned through suitable gearing. Change in rate of flow is, therefore, in steps—each step requiring a separate operation of the appropriate button. The new cam now being prepared will change the rate of flow by 1,000 cu. ft. per hour for each operation of the button. All

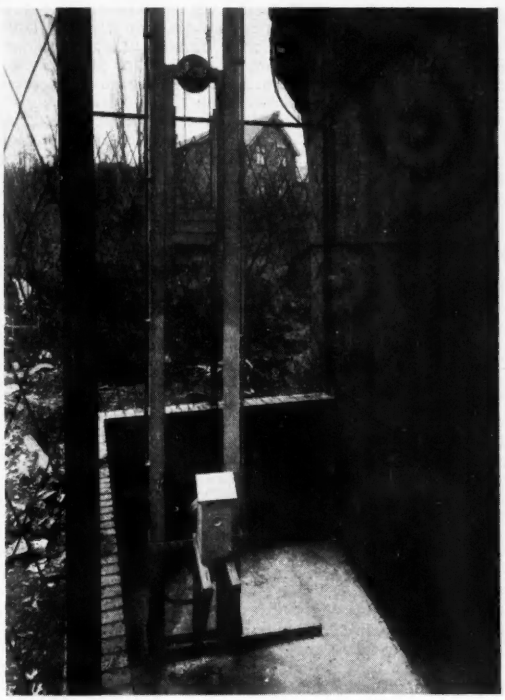


Fig. 5.—Showing part of the mechanism and the transmitter at the holder.

readings and indications may be checked at any time by operating a "check key" on the control panel. This causes an impulse train to be transmitted from the sub-station to the control room.

Telephone communication is provided between the control room and Dronfield. The circuit arrangements are such that a telephone conversation takes precedence over all transmissions except those of holder limit or other alarms. These take precedence and the conversation is interrupted for a short period while the alarm condition is transmitted to the control room. The signalling apparatus is designed to operate from a 50-volt d.c. supply, and 50 volts batteries and chargers are fitted at either end of the equipment. The batteries are normally floated across the chargers and the load is taken by the chargers which are connected to the main 230 volt a.c. supply. Should the main supply fail at either or both ends of the equipment, the apparatus is supplied by the batteries, which have sufficient capacity to provide at least a 10-hour stand-by supply. The battery supplies are suitably fused and audible and visible alarms are given on the control panel when either control room or holder station fuse blows.

Expectations Fulfilled

The equipment has fulfilled all expectations and has proved to be a most effective way of controlling very efficiently the supply of gas from a grid to a holder station. Already great economies in labour have been made, and at the same time the control is very much more exact and efficient. The continuous availability of knowledge of conditions at each holder station and the ability to change at a moment's notice the rate of flow of gas into the stations is obviously of the highest possible importance to the operation of a gas grid. It will permit direct supplies to individual consumers and villages on the line of grid mains without reducing the load factor of the compressing

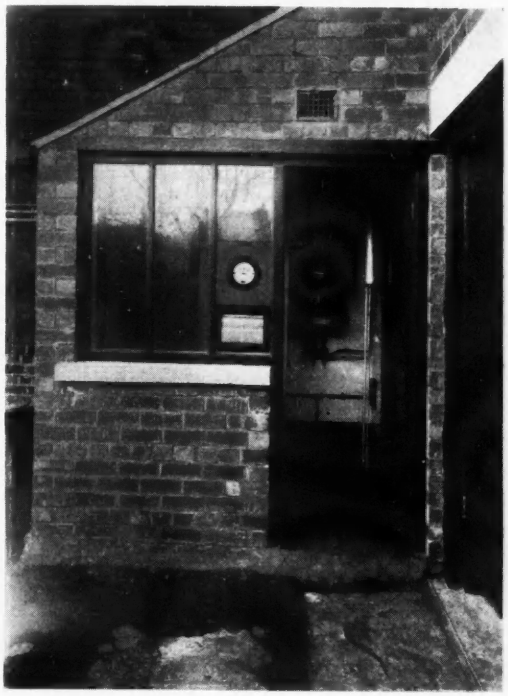


Fig. 6.—The annexe containing the transmitting equipment. This shows the pressure manometer on the right hand wall and underneath the other end of the box containing the operating motor shown in Fig. 2.

plant, and it will reduce the holder capacity required, or conversely improve operation when output tends to outgrow holder capacity. It will provide a wealth of information on the movement of gas in the grid and on the output load factor from each holder station. The information made available is one very satisfactory "incidental" result of this initial installation.

Holder stations can be unattended and yet completely controlled from the central control room, and the possibilities of saving in labour costs are of considerable importance. The full benefits of this system will not be achieved until the other stations supplied by the grid are similarly controlled, but the experience already gained from this installation leaves no doubt of its great possibilities. Hitherto, most gas grid systems have had to be operated to suit the demands of the holder stations, and this has of necessity tended to lower the compressing load factor. With the system of remote volumetric control and indication described it will in the future be possible to operate the holder stations to suit conditions in the grid systems, which would seem to be the correct principle, and one which must be of increasing importance in the integration which will obviously take place in the future.

Hamilton Town Council is to communicate with the Regional Gas Officer and make a strong demand that a larger supply of gas should be made available to the town from the County Council's works at Uddingston. A minute of the Gas Committee, approved last month, expressed strong dissatisfaction at the terms of a letter received by Mr. John Ferns, Engineer and Manager, from the regional official. This stated that Uddingston could not possibly supply the quantity of gas which would be required for the additional needs of present consumers and for the new factories which were being erected in the town. The letter said that there was no alternative but to intimate to the various firms concerned that their demands must be postponed. In his report, Mr. Ferns stated that for some time now the quantity of gas supplied by the County Council had been far below his requirements. It was much below the quantity which the Regional Gas Officer had declared to be available when the arrangement was made for taking a supply from the County as an alternative to building new retorts.

COMMERCIAL AND INDUSTRIAL UTILIZATION OF GAS: NO. 7

By F. DICKINSON, M.Inst.F.,
Industrial Gas Engineer, Newcastle and Gateshead Gas Company

(*Continued from page 315*)

GLASS

Different Types of Glass

ALTHOUGH glass is termed a metal in the trade, and is treated in many ways as a metal, it is really a member of the ceramic group as it is a mixture of oxides, the principal component being sand, *i.e.*, silica. The constituents of glass vary with the requirements of the final product, and typical mixtures for tableware, as an example, are as follows:—

Soda Lime (Crown glass)	lb.	*Lead Crystal* (Flint glass)	lb.
Sand	1,000	Sand	1,000
Dolomite	140	Red lead	600
Limespar	62	Hydr. carb. of potash	320
Felspar	48	Nitrate of potash	42
Barium carbonate	28	Borax	5
Borax	40	Arsenic	3
Soda ash	340		
Hydr. carb. of potash	120		
Soda nitrate	50		

An equivalent batch mix for other commercial products could be somewhat as follows:—

	lb.
Sand	605
Soda ash	222
Potassium nitrate	50
Felspar	42½
Lime	94
Arsenic trioxide	2½
Total	1,016 lb.

The above would be mixed with 2,000 lb. of cullet, and about 70 mixes fed into the tank per 24 hours.

As a mixture of soda and silica is soluble it is necessary to add lime and other oxides, &c., to make it stable. The addition of lead and potash produces a brilliant glass, soft and suitable for decorating, while increased soda makes the glass easier to work, but reduces the brilliance and durability. In tableware, then, the soda lime glass is used for common plain ware and lead crystal glass for cut glass. It is not general practice to charge a new mixture as above, or "batch," in its entirety into a melting pot or tank. It is usually mixed with a proportion of broken glass of similar constituents and colour, termed "cullet," in a suitable ratio of the order of, say, 60% cullet to 40% batch. All original and mixture ingredients are very carefully weighed and thoroughly mixed prior to melting. The combined batch and cullet mixture is fed into tanks at regular intervals, as above, but in pot melting it is sometimes the practice to fill first with cullet and melt this, then to introduce the batch, finally topping up with cullet, where high temperature and rapid melting of the batch is considered essential.

There are naturally many types of glass, and even in the same trade the glass formula varies with each firm in the light of experience, materials available, and the final characteristics considered desirable by them, but the following list gives a broad indication of a number of well-known glasses, as follows:—

White and coloured bottle glass.
White hollow plain and crystal glass.
White and coloured moulded glass.
Window, plate, and wire glass.
Glass tubing.
Coloured plane glass.
Ornamental glass.
Electric lamp and valve glass.
Special glasses, (optical, laboratory, heat-resisting, etc.).

Melting

The batch of raw materials, or the mixture of batch and cullet, has to be placed in either refractory pots of special shape, or fed at regulated intervals into refractory tanks of various sizes and shapes, where it is subjected to direct or indirect heat of the order of 1,350°-1,450°C until the mixture is transformed into a liquid state, *i.e.*, glass, at a temperature of 1,275°-1,375°C dependent upon the nature of the mixture. In a mass of mixtures of this type heated to such high temperature there is not only the main reaction between silica acid, lime, soda, and other constituents leading to the formation of glass, but there are a series of other chemical reactions of importance in regard to the properties of the glass finally produced, which are not solely dependent on the reaction temperature, but also on the composition of the furnace atmosphere in contact with the mass of mixture or the surface of the glass. For instance, quantities of sodium sulphate are added to most glass mixtures as a clarifying medium, most of which disintegrate during the melting period. The amount of residual sodium sulphate dissolved into the glass depends upon the effect of the occluded air between the particles of batch and cullet reacted by the "fining" agents—nitrate of soda and potash and arsenic in the batch which produce large bubbles of gas and collect the fine bubbles or "seeds" as they rise to the surface of the melt—and the equilibrium set up between the resultant gases from sodium sulphate, *i.e.*, sulphur dioxide and oxygen, and the amount of these gases contained in the furnace atmosphere. With a low oxygen content in the furnace atmosphere the sodium will disintegrate to a greater extent than with a high oxygen content, and this is desirable to ensure freedom of seeding or air-bubbles in the glass during processing. There are thus two main melting processes, the founding period when the batch is fed into pots in several fillings to enable chemical reaction between the components and release of bulk gases from the mix, and the "plaining" period when the molten glass is being slowly clarified and seeding eliminated.

Other reactions of considerable importance where water-white glass is required are the effects of oxidation or reduction in the furnace atmosphere upon colouring ingredients in the glass, which may occur at various stages of oxidation. Although colouring oxides may not have been added to the mix there is always a trace of iron in the form of oxide or lower oxides, according to the oxidizing or reducing atmosphere when melting, and as the silicic acid combinations of the two oxidation stages of the iron are differently coloured the final tinge of the glass depends upon the degree of oxidation or reduction. As the combinations of trivalent iron colour glass much more weakly than divalent iron it is necessary to adjust furnace atmospheres so that the greatest possible amount of any iron content is left in its trivalent form. Any final tinge is removed by the addition of some form of silenium combination which produces a complementary colour thus giving a general impression of "white" in the final glass. These decolorization mediums are also influenced by furnace atmosphere conditions to a great degree in their effectiveness so that decolorization of white glass is primarily a matter of melting conditions where exposed to furnace atmospheres.

Besides these chemical reactions the currents set up in the molten glass also play a big part, especially in the case of continuous-working tank furnaces where active currents are set up in the molten glass by the difference in temperature between the surface of the glass heated from above and the comparatively cold walls, particularly towards the filling end. These currents can affect the properties of the finished glass in a most enduring manner.

Another important item is the viscosity of the glass which must be maintained to a defined degree to ensure even distribution of the glass at all points in a mould, or defined thickness at all times during the drawing of window or plate glass, and is a function of temperature. The withdrawal temperature is usually some 300°-350°C below melting temperature, and ranges between 1,000°-1,100°C depending upon the type of processing, the weight of glass withdrawn at a time, and the time required for shaping the article. This viscosity-temperature demand is highly sensitive, particularly where continuously operated automatic machines are used, and is considered to be more sensitive to registration of variation than the most accurate temperature measuring instruments.

The incidence of using closed or open pots, small tanks or large tanks depends on a number of circumstances such as colour, type of glass, quantity of output, hand or automatic machine processing, and the cycle of operations common to a district or section of the trade. For example, in the hand processing of electric lamp bulbs this work is done during normal daytime hours, the founding from, say, 5.30 p.m.-8.30 p.m., and the "plaining" overnight where pots are used, and the same for moulded tableware. In the Stourbridge area the founding is done in larger pots of about 15 cwt. capacity over a Thursday night to Saturday period, the "plaining" until Monday night, after which the pots are worked continuously until emptied. In passing, it should be noted that where coloured glass is produced in a pot it is impossible to revert to a lighter colour in any pot

during its operating life without risk of tinges of darker colour affecting the ware, but darker colours can be worked in pots which originally held lighter coloured glass. When melting in tanks, which can hold anything from a few tons up to 200 tons capacity, the batch and cullet is fed in comparatively small quantities at defined regular intervals in accordance with the output, and having been melted by the combined action of immersion in the existing molten glass and the heat of combustion at one end of the tank, it is "plained" in that segregated section and flows below a refractory bridge into the main chamber where it mixes with the bulk portion of molten glass and works its way steadily towards the discharge or withdrawal end. The time taken from insertion of the batch and cullet at the "doghole" to withdrawal varies from 24 to 72 hours, according to size of tank, and rate of withdrawal.

General Processing

The general preparation and melting of the mix has been fully discussed, but mention must be made of the desirability of having the components absolutely dry, and it is accepted practice to dry the sand in a small rotary gas-fired dryer, the consumption rate being about 500-600 cu.ft. per hour, but this depends upon the size of the unit and the output of sand per hour.

Pot Furnaces

These can range from the single or double pot furnace to the large multiple pot furnace holding 10 to 12 pots. The former are more for experimental or special glass requirements, and the four or six pot Siemens furnace size may be considered more appropriate for normal production demands. This furnace is usually "D" shaped in plan, the gas and air flowing through ports in the floor on one side and venting on the opposite side to the stack after passing through regenerators, with reversal of flow every half hour so preheating the air and gas, which originally was producer gas. Successful conversion to town gas is simple and can consist of inserting a 4 in. gas pipe in the setting as near to the point of entry as practicable, reversing as before. The gas rate for six pot "D" furnaces would be about 5,000 cu.ft./hour for maintaining, 6,000 cu.ft. when drawing glass, and 8,000 cu.ft./hour when founding. The 10-12 pot furnaces are circular, the air and gas being led into the centre or "eye" of the furnace where combustion commences, and continues under the domed arch, the flue gases being vented at ports at the sides of the pots at low level, after which they are collected into a common flue and pass through a recuperator, in contra-flow to induced air flow, en route to the stack. The gas consumption varies from about 7,000 cu.ft. per hour when maintaining the furnace at about 1,350° C. to 8,000 cu.ft. when drawing glass, and 9,000-10,000 cu.ft./hour when founding.

The pots used vary in shape and size. For some glasses the products of combustion must not be allowed to be in contact with the glass and closed pots are used, but where this is not considered to be detrimental then open pots can be employed. The manufacture of the pots is a trade secret and retained in the hands of a comparatively few skilled men. After they are made they have to be very carefully dried for a long period under controlled air change and temperature conditions which lend themselves admirably to gas-fired boiler applications with room thermostats. As pot life is a vital factor in glasshouse economics every step is taken to prevent any factor which will shorten their working life under final operating conditions, and as any change in materials or processing cannot be satisfactorily assessed until a period of one or two years after modification there is considerable conservatism about making alterations from proven materials or methods.

The pots are fired in readiness for use in furnaces called "pot arches" in accordance with the glasshouse demand for new pots, the pots in operation being recorded when placed in the wickets and under constant supervision for impending failure. Depending upon the size of pots it takes from one to two weeks for firing, and pot arches vary in capacity holding from one to four pots. The practice is to lift the temperature by 100° C. per day until 700° C. is attained. This is maintained for two days as it is the critical firing period, and the temperature is then lifted to 1,000° C., but prior to removal it is again lifted to 1,050°-1,100° C. to allow for drop in temperature during removal and setting. The usual fuel has been coal, but it is now done with gas under better and more consistent control, as a check meter can be installed for this purpose and the gas rate set daily to produce the desired temperature lift. Careful records are kept of the firing rates of each heating cycle and any variation from normal procedure can be ascertained at a glance.

Owing to growing difficulties in respect of obtaining adequate supplies of suitable pot clays, and the men to produce the pots there is a trend towards their replacement by small tank furnaces. This is very marked in America where considerable experiments have been made, but there would seem to be a need for several single or two-pot furnaces in those glassworks where there are occasional demands for small quantities of special glasses.

Ring Heating

An ancillary heating process in connexion with open-pot operation is that of preheating the refractory split rings which are placed upon the surface of the skimmed molten glass to prevent scum from collecting at the point where the tube is inserted for gathering. The half-rings are preheated to about 1,000° C., placed upon the cleaned glass surface and pressed below glass level for a few minutes to allow them to stabilize temperature and receive a coating of glass which will prevent particles of refractory from floating into the collecting area.

Tank Furnaces

These are normally rectangular in shape, and of dimensions to meet the cycle of operations and output demands. Most tanks follow the same general design with the charging at one end, withdrawal at the other end, and the central portion undisturbed to allow for mixing, plaining, and stabilization of the glass before use. The disposition of the charging point depends upon the firing arrangement. It may be on the end or on one side, depending upon whether the tank is side or end fired, respectively.

Small tanks are made for either experimental purposes or for special glasses. An average type could be 3 ft. wide by 6 ft.-8 ft. long, fired at one end towards one side so that the flow of gases would travel horseshoe fashion returning to a flue vent at low level adjacent to the burner, and passing through a recuperator to the stack. The filling hole would be on the side wall near to the burner, and the withdrawal ports, three in number, at the far end. Medium sized tanks may continue to be long and narrow, but often tend to be rather wider and shorter. A typical case would be 8 ft. 6 in. wide by 9 ft. long, cross-fired with a glass depth of about 3 ft. 6 in. capacity of 19½ tons, batch and cullet input of 9½ tons per day, and an output of about 38 tons of glass per 5½ day week. Most of the above are for hard working from a number of "working holes," whereas the large tanks, which can vary from 100 to 1,000 tons capacity, but are usually of 150 to 300 tons capacity, are mainly used in connexion with one or a number of fully automatic machines for the manufacture of sheet glass, bottles and electric lamps, bulbs and valves. A large tank for supplying one or more machines could be 20 ft. wide by 50 ft. long, cross-fired regenerative with half-hourly reversals, with a glass depth of 3 ft. 3 in. at the melting end varying to 2 ft. 3 in. at the refining end, having a capacity of 300 tons and an output of about 600 tons per week.

Primary Operations

After the glass has been melted and clarified by "fining" it is maintained at a temperature of about 1,000° C. for withdrawal. Dependent upon the type of glassware produced this is done by one of several methods, each of which requires co-ordinated team work and timing, as follows :—

Hand blowing

In bulb and bottle ware the team consists of a gatherer, glass-blower, wetter-off, finisher and a boy to take the finished articles to the annealing lehr. A number of blowpipes are in circulation during the processing, and these are hollow steel tubes each 5 ft. long by ¾ in. outside diameter by ¼ in. bore with slightly bulbous ends. Several pipes are kept stacked on a resting place near to each pot with the noses in the working hole to preheat them. The gatherer takes a heated pipe, inserts it in the working hole until it touches the surface of the metal, and gathers a sufficient quantity of glass whilst rotating the pipe. He steps away from the working hole blowing through and rotating the pipe continuously, with an occasional swing, until the red-hot glass assumes an elongated pear shape. The pipe is then handed to the glassblower who continues the operation, with or without the use of a "marver" for rolling—as required—until the glass is approximately the shape and size desired, when he opens by foot-treadle a hinged cast iron mould of correctly machined internal dimensions, and passes the still red-hot shape into the mould, releasing the treadle and continuing to blow and rotate the pipe until he is satisfied that the glass has been evenly spread to the mould walls and assumed its final shape. The mould is then opened, the shape ejected by the wetter-on who touches the neck with a piece of cold steel at a predetermined point, rotating the glass so that the surplus glass falls off. A finisher picks up the article, reheats the neck in a glory-hole furnace, gives the final shape to the neck, when it is collected by the boy who carries it to the charging end of the continuous lehr.

Pressed ware—mostly tableware

The gatherer collects the glass from the pot with his pipe, blowing and rotating this to a suitable size and holding it above a die where a man cuts off an appropriate amount as it is dropping into the die. The latter is placed under a mating die in a press which is pulled down by a hand lever and held until the glass has flowed into the engraved design. The loose die is withdrawn and tapped to eject the shape which is then reheated in the glory-hole furnace, finished, and sent to the lehr.

Semi-automatic machines

These are essentially for the mass production of similar shapes such as bottles, bulbs, valves, etc., and combine most of the

operations defined above in each machine. The use of tank furnaces is essential to maintain the higher output with precise control of glass quality and temperature, and it is usual practice for the working end of these tanks to be semi-circular in shape so that a number of channels can be arranged to feed glass to each of a group of machines. At the outlet end of each channel there is fitted an automatic valve, submerged in the molten glass, which feeds a "gob" of glass to each unit of the rotating machine as it comes into position below the valve. The gob is collected into a cast iron cup where it is held by vacuum until the cup is turned downwards over its mould, when air is applied and the cup is rotated until the glass is extended to the correct pear shape elongation, the mould opens for the glass shape to be moved into it—still rotating and being blown—until the stage is reached for cutting off the air, opening the mould, and ejecting the article on to a conveyor for further processing.

Fully automatic machines

Here the withdrawal end of the tank, or fore-hearth, can be square, as whilst this type of machine operates as above, it is not fed by an automatic valve, but is arranged for one or more arms with cup heads to lift at the correct time, move into the fore-hearth, dip into the glass, gather the correct amount of glass by vacuum, retract, and then continue the shaping process.

Sheet Glass

The original process was to blow glass into a cylindrical shape, cut these into longitudinal pieces and reheat them for flattening. This has been almost entirely superseded by the machine drawing process. The glass is drawn vertically upwards from the tank in a continuous stream through a series of driving rollers, and when set is annealed in vertical or horizontal lehrs prior to cooling, cutting and stacking. The best known systems are the Fourcault, Libbey Owens and Pittsburgh which are similar in general principles, but differ in details.

Rolled plate glass is made by either pouring glass on to a flat table and rolling it to the required thickness, or by continuous flow over a weir to rollers through which it moves until set and so through the annealing lehr.

When polished plate glass is required it must be rolled on casting tables, annealed, and the surfaces ground with sand and water before the final polishing with rouge.

Rod and tubing

A considerable amount of this is still made by hand. A gatherer draws sufficient metal with his pipe, rolls it on a marver, his assistant attaches a gathering to the other end of the metal, and they move apart, blowing all the time until the requisite length of rod or tubing is made. The rod or tubing droops as they move apart and is allowed to rest on a series of triangular wooden supports placed apex upwards and about 9 in. apart. Tubing made this way is remarkably exact in final dimensions in both small and large sizes, whether checked for bore and outside diameter by gauges, or, in the case of the bore of thermometer tubing, by liquid tests. Machine-made tubing is produced by allowing a continuous stream of metal to flow onto a rotating and slightly inclined air-cooled mandrel from the nose of which it is drawn steadily away and cut into suitable lengths. A modern practice is to draw the glass vertically upwards from a glass feeder, in a similar manner to the sheet glass process.

Optical glass

Owing to the high degree of perfection demanded of optical glassware meticulous production methods have to be adopted. The raw materials must be as pure as possible and accurately mixed, whilst pots must be very carefully made to avoid any adulteration of the batch. Constant stirring of the batch during founding is essential to ensure even distribution of the components. When the melt is considered satisfactory, the pot is withdrawn to cool in air until the glass commences to solidify; it is then transferred to a heated pot-arch and cooled off very slowly. When cold, the pot is broken away from the solidified glass which is carefully examined. Suitable pieces are chipped to the approximate shape and weight required, re-heated to softening point and pressed into square or rectangular moulds, after which the slabs are annealed, opposing faces polished for further examination, and sound slabs cut to desired shapes in readiness for final grinding and polishing.

This has been the universal practice for many years, but modern American practice favours the use of small special tank furnaces for the melting of optical glasses, and claims that the desired purity of glass can be obtained by this method.

Glass fibre

Two types of fibre are generally produced *i.e.*, "continuous" and "staple," with commercial applications almost equivalent to their respective textile parallels—silk and cotton.

"Continuous" fibre is produced from high quality glass melted in a small tank furnace, carefully "plained" to produce an homogeneous clarified mixture that will ensure precise viscosity and uninterrupted flow at the critical pouring temperature This is essential for the production of very fine fibre of uniform thickness having the requisite flexibility and tensile strength for fabrication purposes. The molten glass is not led direct from the tank to the boat-shaped platinum receptacles from which the fibre is drawn from a number of small orifices in the base through which the molten glass issues in the form of "tears." It is first fed from the tank by a feeder to a machine which produces glass marbles of a defined size. These marbles are then re-melted in the platinum boats, and one marble produces about 95 miles of fibre. The filaments are each about two ten-thousandths of an inch in diameter and are drawn away from the "tears" at about 100 ft./second on to a rotating drum, being gathered in groups of 102 or 204 to form a thread which is inter-fibre lubricated.

"Staple" fibre is formed by using the high velocity from superheated steam jets, producing fibre which varies in length from 4 in. to 16 in. It is spun into thread in the same way as cotton fibre, need not be so uniform in thickness as continuous fibre, but requires a high quality of glass to ensure that the "tears" are drawn uniformly by the superheated steam without the orifices in the base of the platinum boats becoming clogged. This fibre can be made loose, or directly produced in blanket or mat form, as desired, after which it is dried in a convector type gas-fired oven prior to compression and covering with paper, canvas or glass cloth.

Throughout both processes there is the absolute necessity for close control of heat input, distribution and constant temperature at all stages to ensure straight-line continuous production both in the melting and drawing cycles. This is adequately met by the appropriate applications of town gas.

Glory Hole Furnaces

Reference has been made to the necessity of reheating hand-made bottle and bulb necks for final shaping of this portion of the article. It is also necessary for the finishing of some pressed ware. Originally, the reheating was done in the working holes, but with the development of output rates it has been found preferable to use separate reheating or glory-hole furnaces. As the furnace temperature range is 1,300°-1,400°C the general practice is to employ open flame units with the inherent risk of sulphur blowing. Either fuel oil or gas is used on these furnaces, both of which have a proportion of sulphur in their analysis, so that it is clearly preferable to de-sulphur the gas where sulphur bloom on the finished article is undesirable, and has to be removed by acid washing.

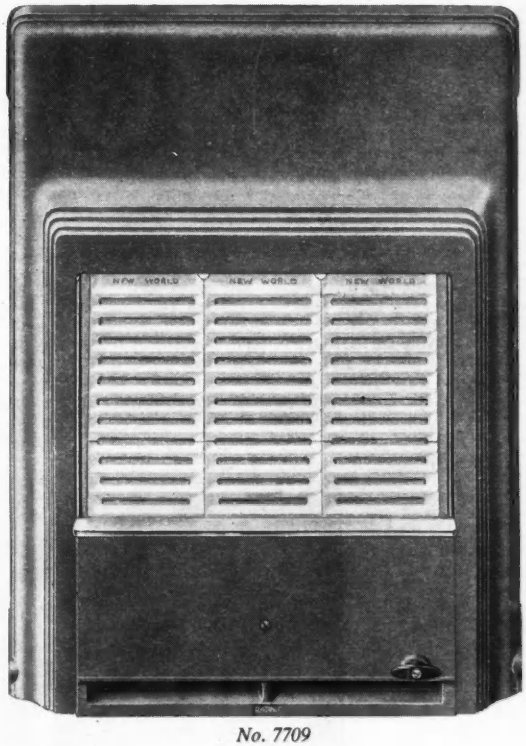
Annealing

This is one of the most important of glass processes after the initial shaping, and it may be necessary to give some articles a primary anneal at this stage as well as a final anneal after other finishing processes where heating is done. Strains are set up in glass when it is cooled rapidly from a high temperature due to contraction as the metal becomes more viscous before setting hard. In cooling, the thinner parts and the outer layers set before the thicker portions, so that as the latter become set they impose strains upon the already hard glass apart from their own residual strains of contraction, and very little additional shock or strain is necessary to break the piece. Above a higher annealing temperature for each type of glass the viscosity is so low that no strains can exist, while at a lower annealing temperature the viscosity is low enough to allow any strains to cause very slow glass flow and disappear. By annealing at or slightly above the higher temperature and cooling at a pre-determined time-temperature circle it is possible to produce constant throughput conditions of strain elimination for known weights of goods, but it is obvious that heavy ware holding residual heat requires little additional heat, and light ware requires heating to reach the appropriate temperature which is about 500° C. for normal glasses and 700° C. for heat resisting glasses. In the past the ware was packed into brick kilns, already heated, and allowed to cool slowly, but, as control of cooling is as vital as that of temperature, this system has been superseded by long continuous lehrs having slat or mesh conveyors upon which the articles are placed at the charging end to travel slowly to the discharge end where they are removed by hand for further operations or packing, according to the degree of finish prior to annealing. These lehrs lend themselves admirably to gas-firing owing to the constant calorific value of this fuel, and its adaptability to control. The question of sulphur blooming again arises in this process, and whilst it is of no great significance with coloured glass, it must be entirely eliminated for water-white glasses and first quality glass.

The amount of sulphur content in town gas is low in relation to that in other fuels, and as it is frequently mentioned in ceramic heat processing, the following table of relative sulphur contents is significant :—

	Sulphur grains per 470 B.Th.U. (gross)
Fuel oil (petroleum)	4.57
Producer gas (coal)	4.39
Coal (direct fire)	3.95
Producer gas (coke)	2,165
Coal tar (creosote oil)	1.27
Town gas	0.15

The Newstead



No. 7709

Yet another of the attractive range of NEW WORLD Silent Beam Gas Fires now coming into production is the Newstead. Somewhat similar in design to the Tewkesbury, it has, however, a much shallower projection forwards from the surround.

The well-known features—common to all NEW WORLD Silent Beam Gas Fires—are the Rado-Panel front; silence in burning; gas governor to adjust and control pressure with consequent economy in use; three-position tap to facilitate changes of output in regular stages according to needs; automatic lighting attachment to make the use of matches unnecessary; minimum servicing requirements.

The Newstead, too, is available in a choice of attractive colour finishes.

Radiation Ltd *Radiation House, Aston, Birmingham, 6. Showrooms and London Offices: 7 & 8 Stratford Place, W.1 (Phone: Mayfair 6*

NEW WORLD NEW WORLD NEW WORLD

Cracking-off and fusing

With semi-automatic and fully automatic machines mass-producing such articles as bulbs, tumblers, &c., these are ejected with excess glass at the top, allowed to ensure good flow conditions during the forming stage, and it is necessary to remove this flash after the primary anneal. The articles are thus transferred by conveyor belt to rotary cracking-off units and fed into holders which rotate them between banks of very sharp premixed air/gas flames giving a fine-line heating contact for fusing the glass at a fixed level, when the flash drops off. Before ejection the heating is continued sufficiently to smoothly finish off the top of the article. It is then re-annealed, examined for faults and if found to be sound is passed forward for packing. In some cases, such as tumblers, a mark is scratched upon the glass with a diamond to assist the precise cracking off as the flames are applied.

Colour burning

Certain glassware, such as milk bottles, petrol pump tops, and opal glass lamp shades require to have colour printing or designs burned on to them for utility or æsthetic purposes. After the ceramic colours have been applied the articles are packed on to a truck or bogey which is moved into a furnace or kiln where the goods are heated up to 550°-850° C. as required by the colours employed, and allowed to cool slowly in the furnace before removal.

In moving through a number of the processes to be found in the versatile glass industry it must have become apparent that fuels play a large and essential part throughout the whole of the processing of this amazing material, and whilst the trade may be said to have originally settled in districts where solid fuel, sand and other essential primary materials were available or easily procurable, the incidence of greater production, new types of glass and ware, new methods of processing and technique, and better transport facilities have all tended to change the background of this industry, where probably the most notable feature is the transition from conservatism in fuel usage to the extensive use of town gas for practically every heat demand. We now find gas used for sand drying, heating boilers for mould lofts, pot arches, melting in pots and tanks of all sizes, glory-holes, annealing lehrs, ring heating, fire-cracking and finishing, and other ancillary processes as and where they arise. Beyond this, too, are the more personal facilities given by space heating, hot water appliances, and canteen equipment.

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FLAME FAILURE INDICATOR

Fig. 1 shows a sketch of a small indicator (Patent Application No. 27436/47) which has been designed by the Gas Light and Coke Company, at Watson House, primarily for use on flat black emitter panels to indicate when panels are alight since in large installations the burners themselves are not readily visible.

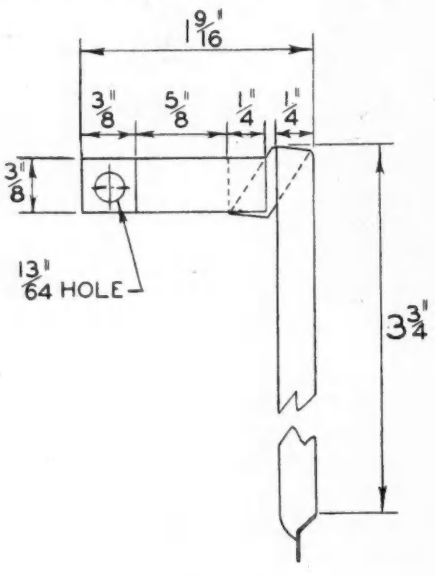


Fig. 1

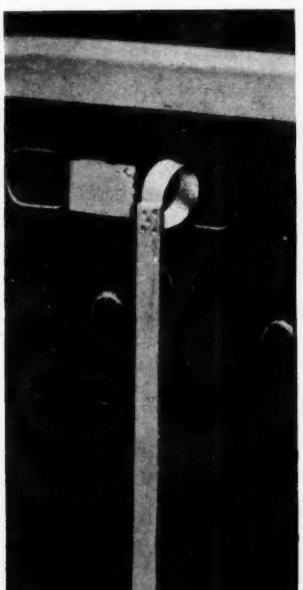


Fig. 2.

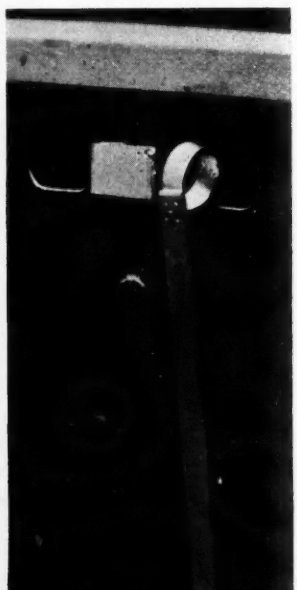


Fig. 3.

It is a piece of bimetallic strip bent into one turn of a helix and extended to form a pointer or flag ; this extension can, of course, be in another metal. The indicator is positioned so that the helix is in the path of the flue gases (Fig. 2), causing the pointer or flag to move inwards, ½ in. to ⅞ in. until it touches the panel (Fig. 3).

The bimetallic material used for the helix is "Saflex," which has the property of giving a slight negative deflection at low temperatures followed by a considerable positive deflection at temperatures above 420° F. As a result, the indicator is insensitive to the radiation from its own and surrounding panels and responds immediately to flame failure although it may be surrounded by hot equipment.

Although the photographs show this indicator fitted to a flat radiant heating panel, there is, of course, no reason why it should not be applied equally well to other forms of equipment.

This indicator is the subject of a Patent Application and arrangements have been made for its manufacture under licence by the British Rototherm Co., Ltd., Merton Abbey, S.W.19.

GAS UNDERTAKINGS' RESULTS

Weymouth Consumers Gas Company

Of a total revenue of £172,347, including £121,293 from the sale of 1,794,849 therms of gas, £9,393 from meter and stove rentals, and £35,571 from the sale of residuals, a balance of £9,149 is carried to net revenue account. Dividend on Ordinary stock is at the rate of 5% per annum, less the interim dividend of 2½% already paid to June 30, 1948. Sales of gas were approximately the same as for the previous year.

Woking District Gas Company

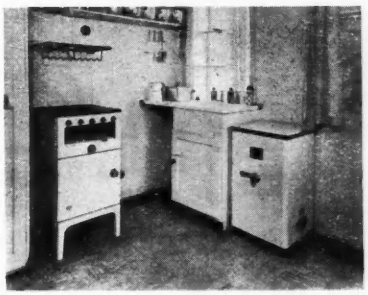
The Company sent out a record total of gas in 1948, the sales of 2,082,490 therms showing an increase of 2.1% over 1947. Of a gross revenue of £220,418, a balance of £16,345 was carried to net revenue account against £19,889 for the previous year. After providing for Debenture and other interest charges, final dividends have been declared at the rate of 5% on the "A" Ordinary stock, making 10% for the year, and 3½% on the "B" Ordinary stock, making 7% for the year, leaving £29,948 to be carried forward to the next account.

Sunderland Gas Company

Net revenue account for the year ended Dec. 31 shows that after deducting interim dividend there is an available balance of £28,703. Payment of a final dividend of 3%, making 6% for the year, leaves £18,733 to be carried forward, against £18,465 brought in. Gas sent out created a new record, being 5% greater than in 1947 and 86% over 1939. This continued expansion necessitated the full utilization of the manufacturing plant and an increase in the capacity of the works at the earliest opportunity. Permission has, therefore, been sought and obtained from the Ministry of Fuel and Power for major plant extensions. During the year a high pressure main connecting the Hendon and Ayres Quay Works was laid to maintain the pressure of gas from the latter works, and to augment the supply to various areas. Considerable work has also been done in providing gas supplies to new housing estates. A further rise in costs necessitated an increase of 0.5d. per therm in the price of gas.

Reading Gas Company

Sales of gas for the year ended Dec. 31, 1948, amounted to 9,186,676 therms, compared with the previous year's record total of 9,443,157, yielding an income of £433,434 against £379,870 for 1947. Revenue from residuals (£257,455) and from the sales of gas apparatus showed satisfactory increases, and a balance of £36,106 was carried to profit and loss account. The balance of net profit to be carried to next account, subject to half-year's dividend to Dec. 31, is £59,346, as compared with £58,202 brought in. Dividends at the statutory rates are payable on Mar. 1. The Directors' report states that a further installation of continuous vertical retorts was completed and brought into use during the year. Further progress was made on a new carburetted water gas plant, and orders were placed for an additional coal gas making installation, additional purifying plants and other works extensions. The high pressure distribution system has been further developed and additional low pressure mains have been installed for new housing estates. On July 1, £15,000 worth of 3½% redeemable Debenture stock was redeemed by the issue of a similar amount of 3½% redeemable Debenture stock (redeemable Jan. 1, 1963).



An interior view in the aluminium bungalow on exhibition at the corner of High Street and Martineau Street, Birmingham, in aid of the Margaret McMillan Memorial Fund. Opened in November by Mrs. Attlee, the bungalow is completely furnished, and its gas-equipped kitchen has a Main No. 177 cooker in cream and black finish.

A Tall Order

A film bearing this title, built round the construction of a 100 ft. high fractionating tower, made by G. A. Harvey & Co. (London), Ltd., to the order of the Lummus Company of New York on behalf of their clients, the Shell Refining & Marketing Co., Ltd., was shown in the British Council Film Theatre on Feb. 3 to a party of trade and technical journalists, the guests of the Directors of G. A. Harvey & Co. (London), Ltd.

The film traces the history of the construction of the tower from the designing board to its erection on the other side of the world, the order for which, obtained against world competition, made no small contribution to earning more dollars for Britain. After a tortuous journey through the heart of London, the tower arrived safely at the end of its journey to be unceremoniously dumped into the sea and towed to its destination at Punta Cardon, Venezuela, on the northern-most tip of South America. In the course of the film views of various departments of Harvey's extensive works at Greenwich are seen, representing but a portion of the type of work undertaken by the 11 different departments.

"A Tall Order" was supported by a documentary film, "Distillation," giving the inside story of the oil distillation for which the towers are constructed, together with "Money at Work," produced by the makers of the "March of Time" series, and a little light entertainment in the form of the General Film Distributors' "Reckless Driver."

GAS STOCKS & SHARES

Total business on the London Stock Exchange in the week ended Thursday evening showed a further slight increase, 34,763 dealings being recorded against 33,885 in the previous week. Despite the substantial increases in the supplementary civil estimates, British funds remained firm and ended the week at an average of 114.0, a figure not previously reached since 1947. Industrial securities, on the other hand, showed a slight falling off.

There was a total of 266 bargains in gas stocks during the week, practically the same as for the previous week, with no marked changes in prices. Severn Valley Ordinary rose 3d. from 22s. 9d. to 23s., the other changes recorded during the week being slight decreases. Of interest on the contracting side of the industry was the announcement on Friday of the formation of B.H.D. Engineers, Ltd., to acquire the issued shares of the Bryan Donkin Co., Ltd., and W. C. Holmes & Co., Ltd., whose separate identity and management will remain as before. Capital is being raised to provide for extensions to plant and buildings, and expansion in technical and commercial personnel. Orders in hand are stated to be equal to three years' work.

Gas stock price changes during the week were as follows:

OFFICIAL LIST

Barnet, ord. 7 p.c. max.	152 — 157	— 1
Bournemouth, 7 p.c. max. div.	152 — 157	— 1
Gas Light & Coke Company, 3½ p.c. max. (xd Feb. 2).	78 — 81	— ½
Imperial Continental, cap.	108 — 113	— 1
Severn Valley, Ltd. ord.	22/6 — 23/6	+ 3d.

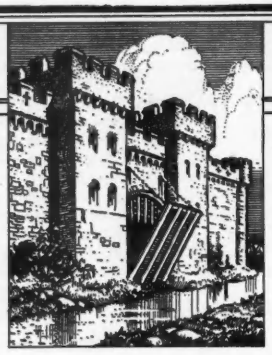
Shell-Mex and B.P. announce reductions, as from Feb. 9, of ½d. per gal. (approximately 10s. per ton) in the prices of Shell gas oil (for diesel engines and other industrial purposes), B.P. Gasoleum (for fishing vessels and small marine craft) and Shell domestic fuel oil (for domestic heating). They also announce, from the same date, a reduction of ½d. per gal. in the price of their "Derv" fuel (diesel oil for road vehicles).

Brotherton & Co., Ltd., announce that under a scheme of reconstruction, which is being carried out with the sanction of the High Court of Justice, the name of the Company has been changed to Brotherton & Co. (Predecessors), Ltd. Its trading interests will be transferred as at Feb. 18, 1949, to a new Company incorporated with the name of Brotherton & Co., Ltd., who will assume responsibility for all liabilities of the old Company arising from such interests.

* *

Boys at Ardingly College, Sussex, learn carpentry under the most modern and comfortable conditions. Large, well-equipped workshops are heated by Gas Overhead Radiant Heaters, as shown here. They provide easily-controlled working temperatures, occupy no floor space, and are low in consumption and maintenance costs.

* *



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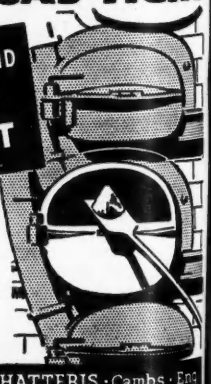

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